Allied-Axis

THE PHOTO JOURNAL OF THE SECOND WORLD WAR



German fully tracked flame throwers

Pz.Kpfw. II (Flamm) Ausf. A and B
Flamingo • Pz.Kpfw. B2 (F)
Pz.Kpfw. III (Fl) • StuG-I (FLAMM)
Flammpanzer 38

German 8-wheel armored cars, Part 2:

Sd.Kfz. 231; Sd.Kfz 232;
Sd.Kfz. 233 and Sd.Kfz 263

The M12 155 Gun Motor Carriage

Kradschützen, Part 2:

BMW, NSU, DKW, Zundapp

Issue 18

Contents

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German 8-wheeled Armored Cars

Schwere Panzerspähwagen Sd.Kfz. 231

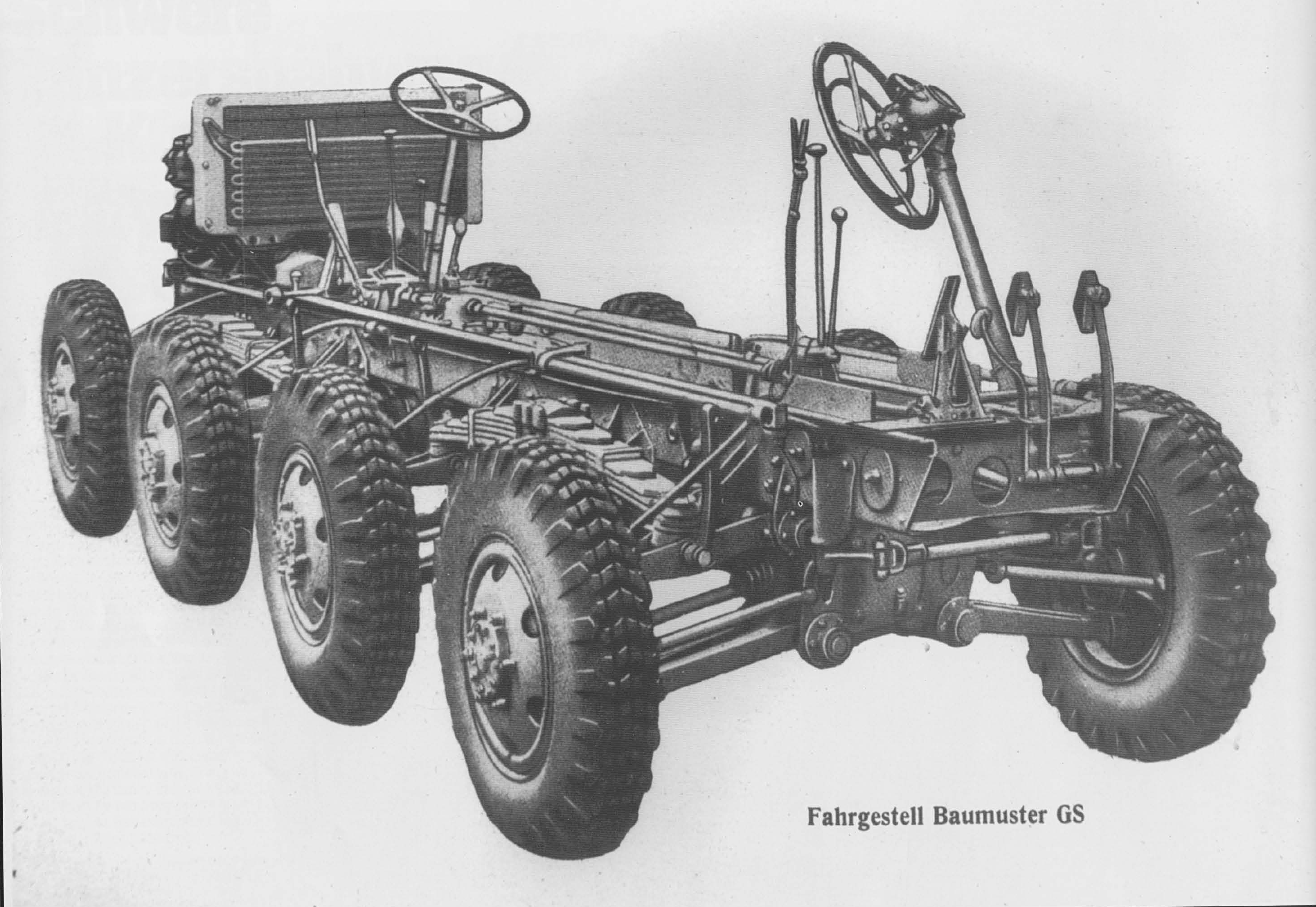


The off-road mobility of the German 6-wheeled armored cars was limited, in part due to their modified truck chassis. Desiring to overcome these problems, the Waffenamt, through its Wa Pruef 6 automotive design office, requested Büssing NAG to design an all-new vehicle. The new vehicle, the uniform eight-wheeler, was powered by Büssing's own 8-cylinder L8V/G.S.36 engine. It entered production in late 1936. All eight of the self-sealing tires drove and steered, and a driver's position was provided in each end of the vehicle, allowing it to be driven at a top speed of 85 km/hr in either direction. In addition to the driver, a co driver, commander and gunner rounded out the four-man crew. The vehicle's armor was sufficient to protect it from 7.92 mm machine gun fire at ground level. A July 1940 modification involved the addition of a spaced armor structure called a Zusatpanzer on the front of the vehicle. In June 1942 the thickness of the basic frontal armor was increased and this structure was dropped. These vehicles were armed with a 2cm automatic cannon, as well as a coaxially mounted 7.92 mm MG34 machine gun. Ammunition stowage was 1,125 rounds of 7.92 and 180 rounds of 2cm, which was adequate when the cannon was fired single-shot. In May 1939 a belt-fed MG 34 with flexible mount began to be installed. At first the 2 cm cannon was the Kw.K. 30, but in 1942 that was replaced by the Kw.K.38. The later cannon lacked the tapered profile of the former. Beginning in 1941, the Sd.Kfz. 231 was fitted with the Funkspechgerät a radio set. Prior to this no radio equipment was carried by the Sd.Kfz. 231. In 1943 this was replaced by the more powerful Funkspechgerät F radio set. Despite the vehicle's overtaxed drive train and the fact that its armor could be defeated by anything equal to, or larger than the U.S. M2 HB .50 caliber machine gun, the Sd.Kfz. 231 (8-rad), as well as the rest of this series, continued to serve until war's end. Here is an example of a factory-fresh Sd.Kfz. 231, less armament. Notice the two-piece driver's hatch, twin forward visors, and turn signal semaphores mounted amidships of the hull. (Walter J. Spielberger)



As seen here, their flush-mounting vision ports can identify the early production vehicles. Also, notice that the mufflers, tailpipes and guards do not extend to the bottom of the fender. Later tailpipes were bent and the muffler and guards reached nearer the bottom edge of the fender. (Walter J. Spielberger)

The Sd.Kfz. 231 and its family of vehicles was built on a conventional automotive ladder-type frame. Leaf spring independent suspension was used. Notice the driver's controls at either end. The engine was installed at the rear of the vehicle.





The earliest vehicles did not have Zusatpanzer, turn signal guards, or even a pipe-type front bumper. Such a vehicle is shown here. Also, faintly visible is the slightly tapered tube of the 2 cm Kampfwagenkanone 30. Later vehicles used the 2cm Kw.K. 38 tank gun. Note the details of the headlight covers and the tool stowage.



This crew clambers aboard another early vehicle. The open visors provide a good example of the thin armor of the vehicle. Note the early and rudimentary structure applied to the front of the vehicle for the installation of smoke grenades.



A Sd.Kfz. 231 is pulled from the muck during a training maneuver in 1938 with the assistance of a Sd.Kfz. 263 and a 6x6 truck. Note the presence of the full turret tarpaulin with its distinctive clear panels. Interestingly, the cover still retains its vivid Reichwehr three-tone camouflage scheme. (Vollert Archives)



The Zusatpanzer plate seen extending from the front of this vehicle was intended to provide additional armor protection from heavy machine guns and light antitank rounds. Unfortunately, the additional weight overloaded the front suspension, especially when crews packed the space between the body and the structure with stowage. The Viking ship painted on the hull side recognizes the service of the General Göring Regiment in the Norwegian campaign. (Patton Museum, Fort Knox, KY)



This vehicle also lacks its turn signal guards, indicating early production. Note the presence of the pivot mount just above the third wheel. This was designed to allow the crew to mount the onboard MG34 for use in anti-aircraft defense. This device was abandoned early in production, as it was found to be highly impractical in combat. Also note the most aggressive pattern of the tires. (Vollert Archives)



This vehicle has come to grief during the Polish campaign and has been abandoned by its crew. As was expected of them, they have stripped it of all stowage and armament. The distinctive leaf-shape of the tire inflation valves can be seen here to good evidence. (Vollert Archive)



A graphic example of the value of the thin armor on the Sd.Kfz. 231. This intermediate production vehicle exhibits the turn signal guards, but still retains the anti-aircraft pivot mount. (Vollert Archives)



Another fatal example of the armor protection provided by the Sd.Kfz. 231. This vehicle has received several hits from the 12.7mm Polish anti-tank rifle. At least three penetrations are visible on the left side of the superstructure. (Vollert Archives)



This captured Sd.Kfz. 231 has been recovered for evaluation by a British operated Mack tank transporter. Notice the open stowage box between the front wheels. The "antennae" on the rear fenders are to aid the driver in judging distances from the limited visibility vehicle. (Military History Institute, Carlisle Barracks, PA)



A captured Sd.Kfz. 231, photographed in March 1943 during its evaluation at Aberdeen Proving Ground. The rear engine access door, as well as the right side fighting compartment door are open. The remains of a rather intricate camouflage pattern are still visible on the superstructure. (NARA)

Schwere Panzerspähwagen (FU) Sd.Kfz. 232



The Sd.Kfz. 232 was intended to provide long-distance radio communications for the heavy platoon of the armored Reconnaissance Company of each reconnaissance battalion. For this purpose, three of these vehicles were assigned to each heavy platoon. The Sd.Kfz. 232 was developed alongside the Sd.Kfz. 231, with which it shares almost every part. They are distinguished by the powerful radio used in the 232. Initially the Fu 11 SE 100, with its massive frame aerial, was installed. With the vehicle stationary, this radio had a voice range of seventy kilometers. Later, this radio was augmented with a short-range radio of the same type, the Funkspechgerät A, that was retrofitted to the Sd.Kfz. 231. Later, the Fu 12 SE 80 radios with the equally distinctive, but smaller, "star" aerials were mounted, rather than the Fu 11 set. In time, the Funkspechgerät F supplanted the Funkspechgerät A for short-range communications. Production of the 232 lasted a bit longer than it did for the 231, with the last one not being completed until 1943, seven years after the first one was begun. This brand-new Sd.Kfz. 232 awaits delivery. The earliest vehicles, such as this, lacked both the additional frontal armor and any form of front bumper. The two-piece driver's hatch is plainly visible. The large hole in the early flush-type mantlet accepted the 2 cm cannon while the smaller one was for the coaxial machine gun. (Walter J. Spielberger)



The engine access doors and the plate covering emergency starter crank port are visible on the rear of the vehicle. Later mufflers and tailpipes were of a different configuration. (Walter J. Spielberger)



This Sd.Kfz. 232 is crossing a shallow anti-tank ditch during the first few days of the Polish campaign. The large, white cross—centered on the rear of the vehicle is indicative of vehicles involved in the invasion of Poland. (BA)



The Sd.Kfz. 232 was distinguished from the 231 by its radio equipment. In the case of vehicles built prior to July 1942, the radio was a Fu 11 SE 100 and the antenna was the massive frame array shown here. Note the distinctive pattern of the exhaust screens. This vehicle was photographed in the Balkans in 1941. (BA)



Photographed from this angle, the three-point forward support for the frame antenna is clearly visible. This arrangement allowed the turret to traverse a full 360 degrees while still supporting the antenna.



This Sd.Kfz. 232 has been side lined during the French campaign due to tire damage. The strange markings on the open engine doors are a portion of a large white swastika painted on the rear deck as an air recognition device. Although not well known, the vertical supports for the large antenna array were made of wood. (Caen Memorial)



This well-battered Sd.Kfz. 232 is seen in Russia during the summer of 1941. The Zusatpanzer, which has been (violently?) displaced from the front end, is now stowed on the rear deck. The barrels of the vehicle's weapons have been covered with cloth to protect them from the grit of the open steppe, but still leaving them operable in an emergency. The vehicle is marked with the distinctive G, indicative of Panzergruppe 2. The name "Bismarck" can also be seen on the superstructure. (Vollert Archives)



Being passed by a Lend-Lease Churchill in Russia, this abandoned Sd.Kfz. 232 is already missing its co-axial armament and external stowage. The presence of the Churchill and the camouflage of the Sd.Kfz. 232 indicate that this picture was probably taken in the winter of 1941/42. This intricate camouflage pattern extends to the Zusatzfrontplatte, which also contains tactical markings. (Vollert Archives)

Schwere Panzerspähwagen (7.5cm) Sd.Kfz. 233



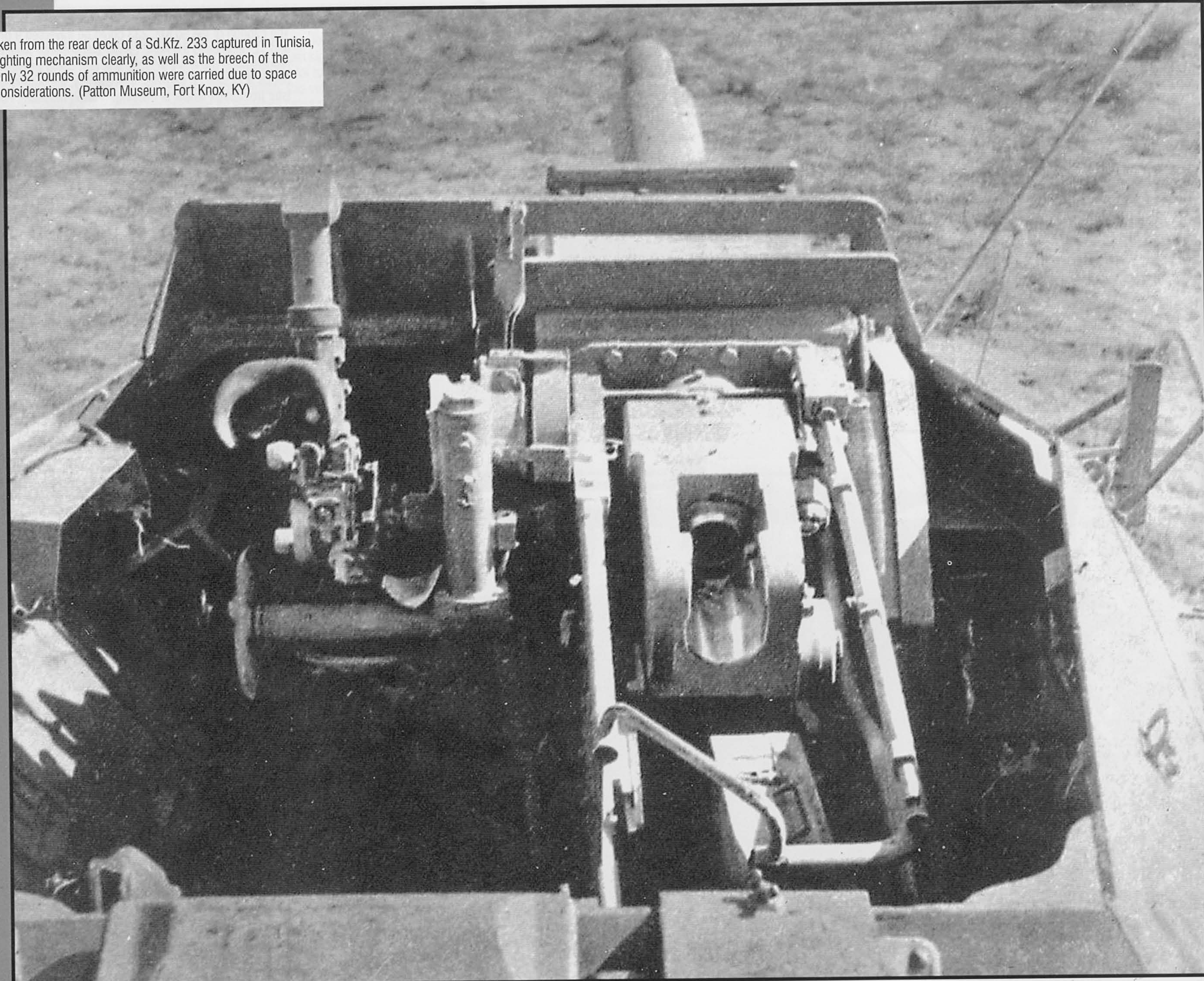
The heavy armored scout vehicle armed with 7.5 cm cannon, known as the Sd.Kfz. 233 provided armored reconnaissance units with a more formidable weapon than they had previously. While the 2cm automatic cannon of the Sd.Kfz. 231 and 232 eight-wheeled armored cars was effective against lightly armored targets, the Sd.Kfz. 233's 7.5 cm StuK was much more effective against medium tanks and more substantial fortifications. These weapons were made available due to the decision to rearm the Sturmgeschütz with a higher velocity weapon. From July 1942 through October 1943, 129 of these vehicles were built by Schichau, most of them newly constructed. But a few were built by cutting down the superstructure of rebuilt Sd.Kfz. 263 vehicles, upon which the 233 design was based. Four men crewed these vehicles, with three of them, the commander, gunner and loader, occupying the open-topped fighting compartment. Due to space and concerns about overloading the already strained chassis, only 32 rounds of ammunition were carried. These vehicles served from Tunisia until the end of the war. This page: Preparing for action in Tunisia, these four new Sd.Kfz. 233 move up from port. Notice that each of the vehicles has four smoke canisters on each front fender. Wire mesh screens protect the headlights. (Patton Museum, Fort Knox, KY)



Some of the earliest Sd.Kfz. 233 were built by cutting down the superstructure of overhauled Sd.Kfz. 263 vehicles. This accounts for the presence of turn signal guards on this vehicle. This feature was discontinued from new production prior to the July 1942 introduction of the Sd.Kfz. 233. Captured intact by the British, this vehicle was carefully examined. Notice the water can (so identified by the white cross painted on it) stowed on the rear of the hull. A spare tire is mounted on the rear of the vehicle, as was the case on all the eight-wheeled armored cars after the self-sealing inner tubes were discontinued. (Military History Institute, Carlisle Barracks, PA)



The cannon of the Sd.Kfz. 233 could be traversed 9 degrees left and 12 degrees to the right. Larger adjustments were made by repositioning the entire vehicle. The gun could be elevated from minus 4 to plus 20 degrees. Interestingly, the outboard smoke canister from each fender is missing. (Patton Museum, Fort Knox, KY)



This view, taken from the rear deck of a Sd.Kfz. 233 captured in Tunisia, shows the sighting mechanism clearly, as well as the breech of the StuK L/24. Only 32 rounds of ammunition were carried due to space and weight considerations. (Patton Museum, Fort Knox, KY)



American forces have captured this Sd.Kfz. 233 and these GI's are employing it against its former owners, as evidenced by the star painted on the front plate. The eight wheel steering of these vehicles is apparent here from the slightly different angle of each wheel. (Patton Museum, Fort Knox, KY)

German 8-wheeled Armored Cars

Schwere Panzerspähwagen (7.5cm) Sd.Kfz. 233



The Sd.Kfz. 263 was designed to provide a mobile base station for panzer unit communications. Intended for use in rear areas, these vehicles were equipped only with a ball-mounted 7.92 mm MG 34 for self-defense as their only armament. Their armor protection, like the other vehicles in this family, was proof only against 7.92 mm armor piercing rounds and smaller, fired from ground level. Rather than a turret, the top of the body was extended upward as a six-sided truncated pyramid. The structure housed a powerful m.Pz.Fu.Tr.b with Fu 11 SE 100 radio set. In addition to the frame, or bow, type antenna, these vehicles were also equipped with a nine-meter telescoping antenna mounted behind the raised superstructure. A crew of five men, a commander, and two each drivers and radio operators, were assigned to each of these



vehicles. Automotively, the Sd.Kfz. 263 was identical to the Sd.Kfz. 231 and 232 8-rad vehicles. Production of these vehicles was ordered in 1937 and continued until January 1943. At that time the production order for the remaining vehicles was changed to the 7.5 cm-armed Sd.Kfz. 233. Like all the vehicles in this series, the Sd.Kfz. 263 was built by Schichau on a Büssing-NAG GS chassis. **Left:** This brand new Sd.Kfz. 263 was posed for photos at the factory in 1939. The ball mount for the self-defense machine gun can be seen in the front of the superstructure, although the weapon itself is absent. (Walter J. Spielberger) **This page:** Like the rest of this family of vehicles, the Sd.Kfz. 263 had a forward-opening storage locker built into each fender. The mottled appearance of the paint is the result of the two-tone dark brown spots on dark gray base camouflage. (Walter J. Spielberger)



This very early Sd.Kfz. 263 is seen in the aftermath of a training exercise. The full canvas cover for the superstructure is in place. Like most armored vehicles the Sd.Kfz. 263 was not waterproof! The nine-meter telescopic mast is extended. (Fellmuth)


A clean Sd.Kfz. 263 is a happy Sd.Kfz. 263! This crew enjoys both giving and receiving a bath. The proximity of the crew to the vehicle gives a good impression of its general size. (Fellmuth)



All the crewman seen here in these two photos are decked out in their finest, with shined leather and felt gloves in evidence. The purpose is most likely a parade or other public display. These shots also provide an excellent perspective of the early panzer "beret." These uniforms were in most respects identical to their tanker counterparts, but marked with the appropriate arm of service piping color. In this case, most likely yellow. The shot at left shows some rarely seen uniform details, such as the marksmanship lanyards (two versions) and the officer's parade belt on the man on the right. (Fellmuth)





A 7th Panzer Division Sd.Kfz. 263 moves across a bridge sometime prior to 1941. Notice the arc in the near side of the frame antenna. This was necessary to prevent interference with the nine-meter telescopic antenna, seen here with its protective cover in place. (Patton Museum, Fort Knox, KY)



The pistol ports are visible on the side of the superstructure in this photo taken in North Africa of a captured Sd.Kfz. 263. Note the different tread patterns on the vehicle's tires. Following a precedent set by Rommel, some commanders used the Sd.Kfz. 263 as a mobile command post. (Patton Museum, Fort Knox, KY)



The palm tree emblem of the Afrika Korps can be seen centered on the side of this vehicle. Notice one of its pistol ports is in the open position, and the 9-meter antenna has been retracted and covered with cloth. On the rear of the frame antenna is an aerial recognition flag, intended to keep Luftwaffe pilots from attacking their comrade's vehicle. (Patton Museum, Fort Knox, KY)

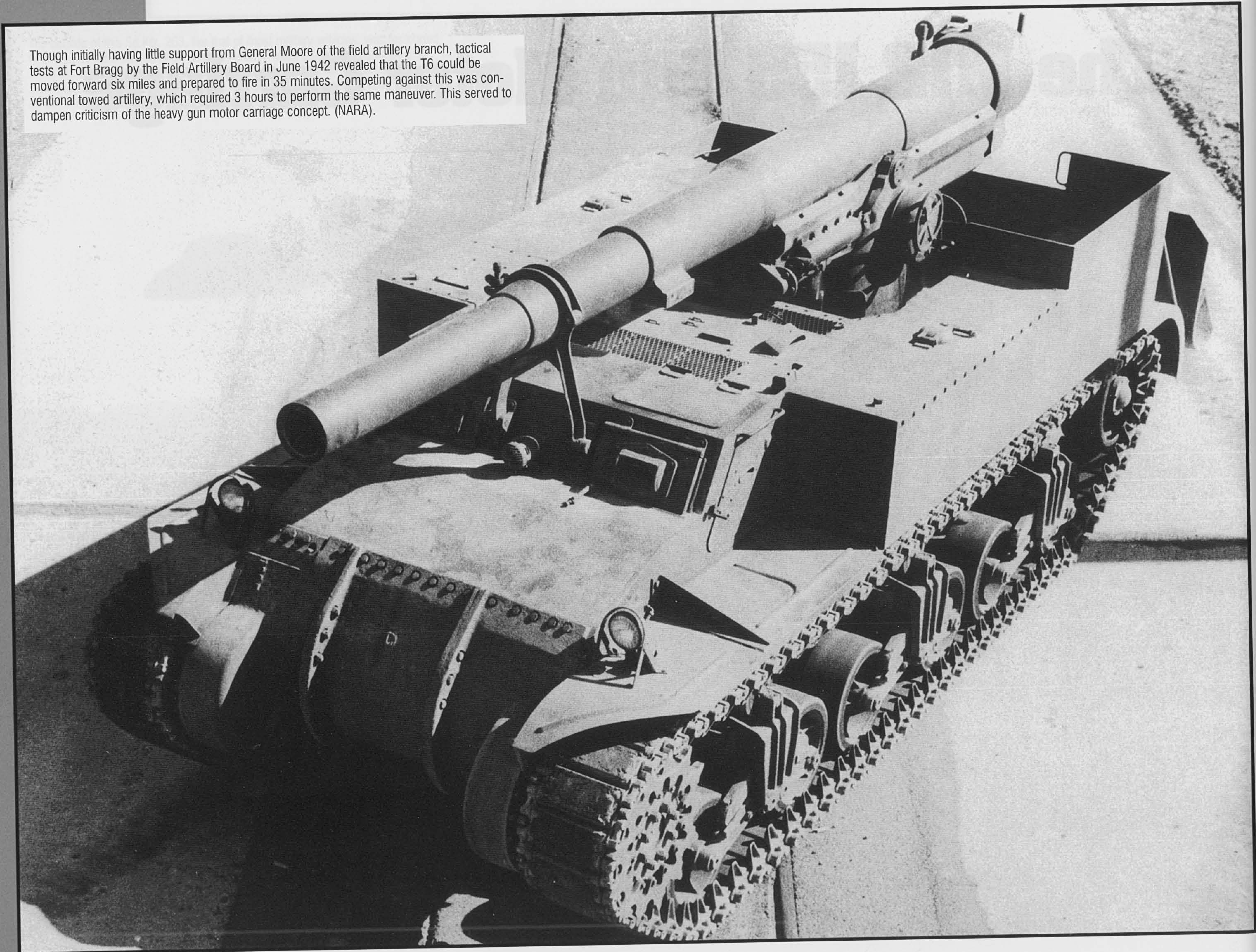


The outside of this Sd.Kfz. 263, like that of most military vehicles, was festooned with considerable additional stowage. The extra water cans, identifiable by their white crosses, were especially valuable for the men of the Afrika Korps. A large swastika flag has been draped over the rear portion of the antenna array to act as an air recognition device. (Patton Museum, Fort Knox, KY)

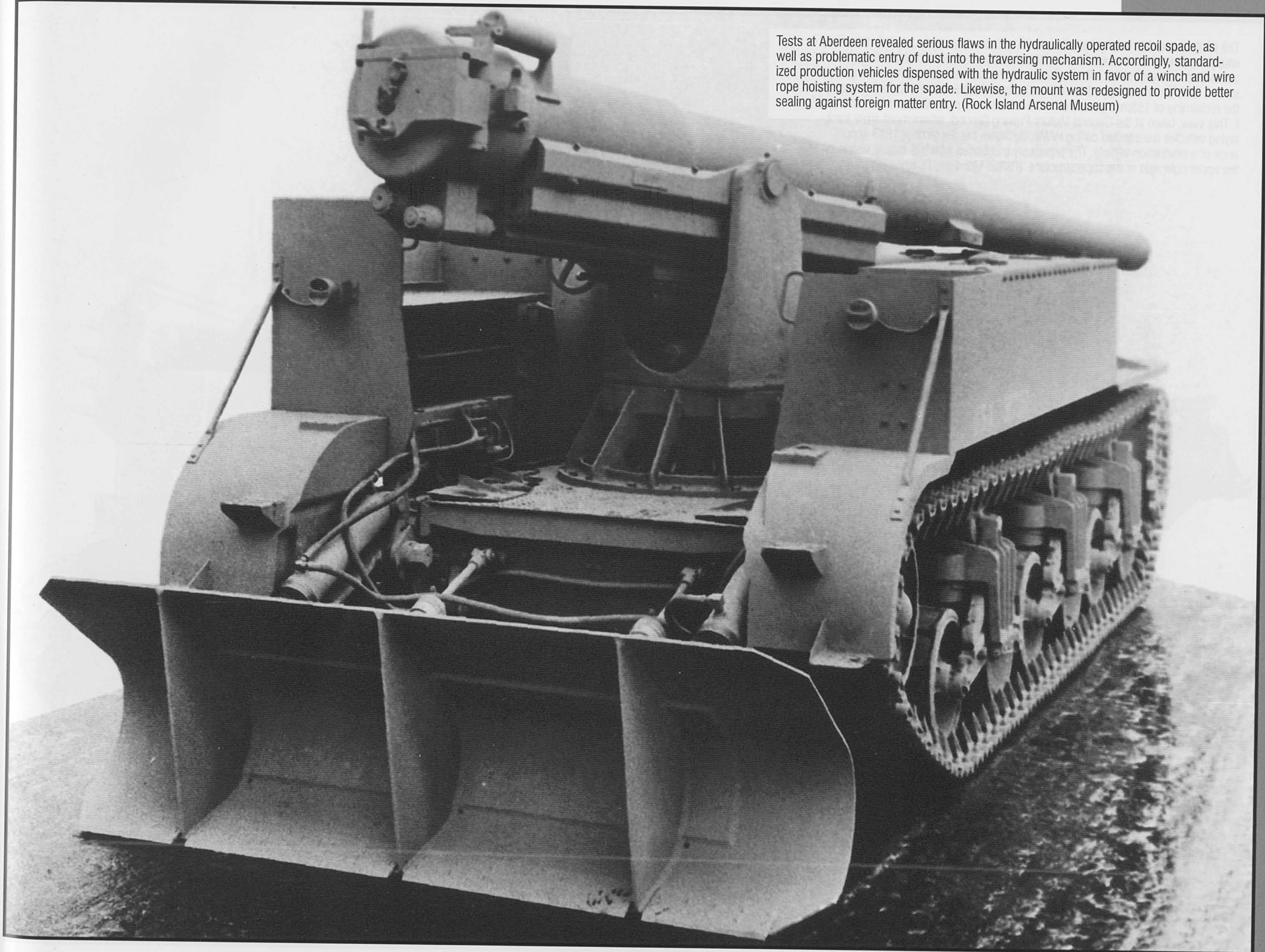
The M12 155 Gun Motor Carriage



Though ten 155mm cannon had been mounted on motor carriages in 1918 by Rock Island Arsenal, the idea lay dormant for years. Development of 155mm Gun Motor Carriages resumed in earnest in June 1941, having been initiated by Ordnance Committee action. The pilot, known as the T6 and shown here, was built at Rock Island Arsenal. It consisted of a 155mm Gun, M1918, M1 mounted on a chassis derived from the M3 medium tank. It was completed in February 1942 and shipped to Aberdeen Proving Ground for testing. (MVPA Archives)



Though initially having little support from General Moore of the field artillery branch, tactical tests at Fort Bragg by the Field Artillery Board in June 1942 revealed that the T6 could be moved forward six miles and prepared to fire in 35 minutes. Competing against this was conventional towed artillery, which required 3 hours to perform the same maneuver. This served to dampen criticism of the heavy gun motor carriage concept. (NARA).

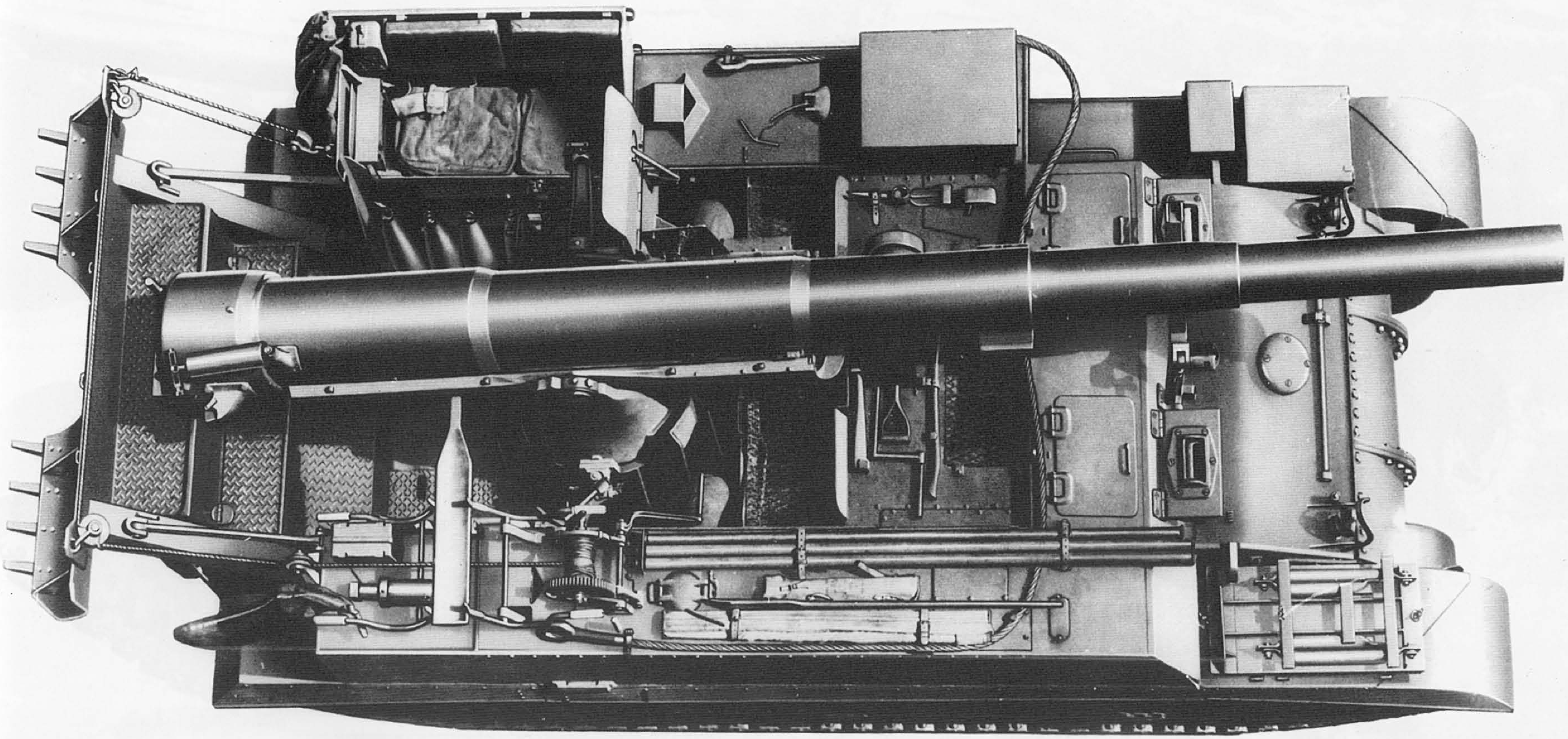


Tests at Aberdeen revealed serious flaws in the hydraulically operated recoil spade, as well as problematic entry of dust into the traversing mechanism. Accordingly, standardized production vehicles dispensed with the hydraulic system in favor of a winch and wire rope hoisting system for the spade. Likewise, the mount was redesigned to provide better sealing against foreign matter entry. (Rock Island Arsenal Museum)

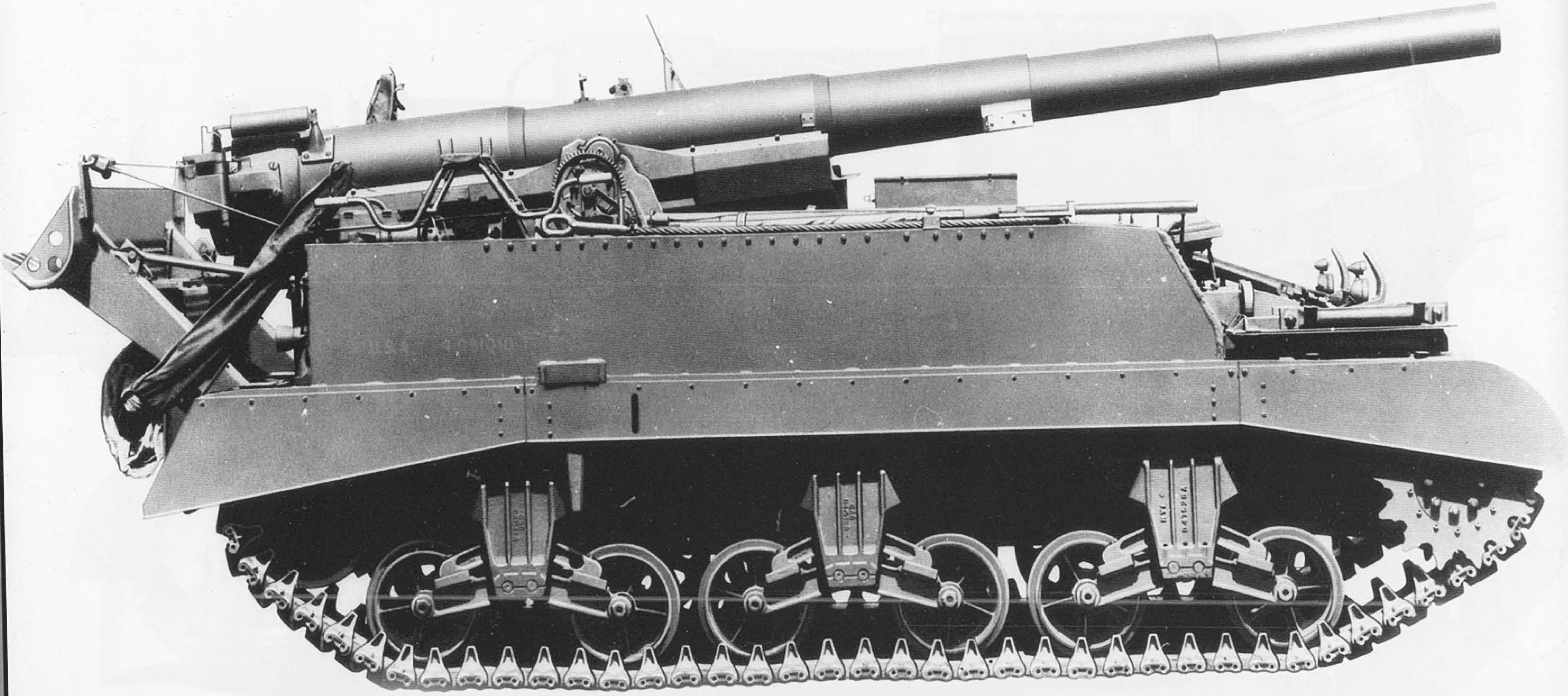


The M12, as the T6, was recommended for standardization on July 25, 1942 and was produced by the Pressed Steel Car Company. An order for fifty vehicles was authorized in July of 1942, with the weapons themselves coming from Army stocks. This order was upped to 100 vehicles on August 10, 1942, necessitating the reclaiming of 155mm guns that had been used on monuments to World War I. This view, taken at the General Motors Proving Ground, where most army track-laying vehicles were tested during WWII, illustrates the September 1943 appearance of a production vehicle. The previously mentioned winch is clearly visible on the upper right side of the superstructure. (Patton Museum, Ft. Knox, KY)

This Raritan Arsenal photo was used to illustrate the vehicle's manuals. Despite its retouching, it does provide an excellent overall view of the layout of the Gun Motor Carriage. The Continental R975 C1 engine, located in the rear of the M3 medium tank upon which the vehicle was based, was relocated well forward. (Patton Museum, Ft. Knox, KY)



Another Raritan Arsenal view, this time showing the sand shields in place. These were not installed at the time of manufacture, but rather were attached at tank depots prior to the vehicles being shipped to using units. The manufacturing branch requested this work, along with replacement of the fuel pump and installation of extension handles for the operation of Cumo oil filters, on February 10, 1943.

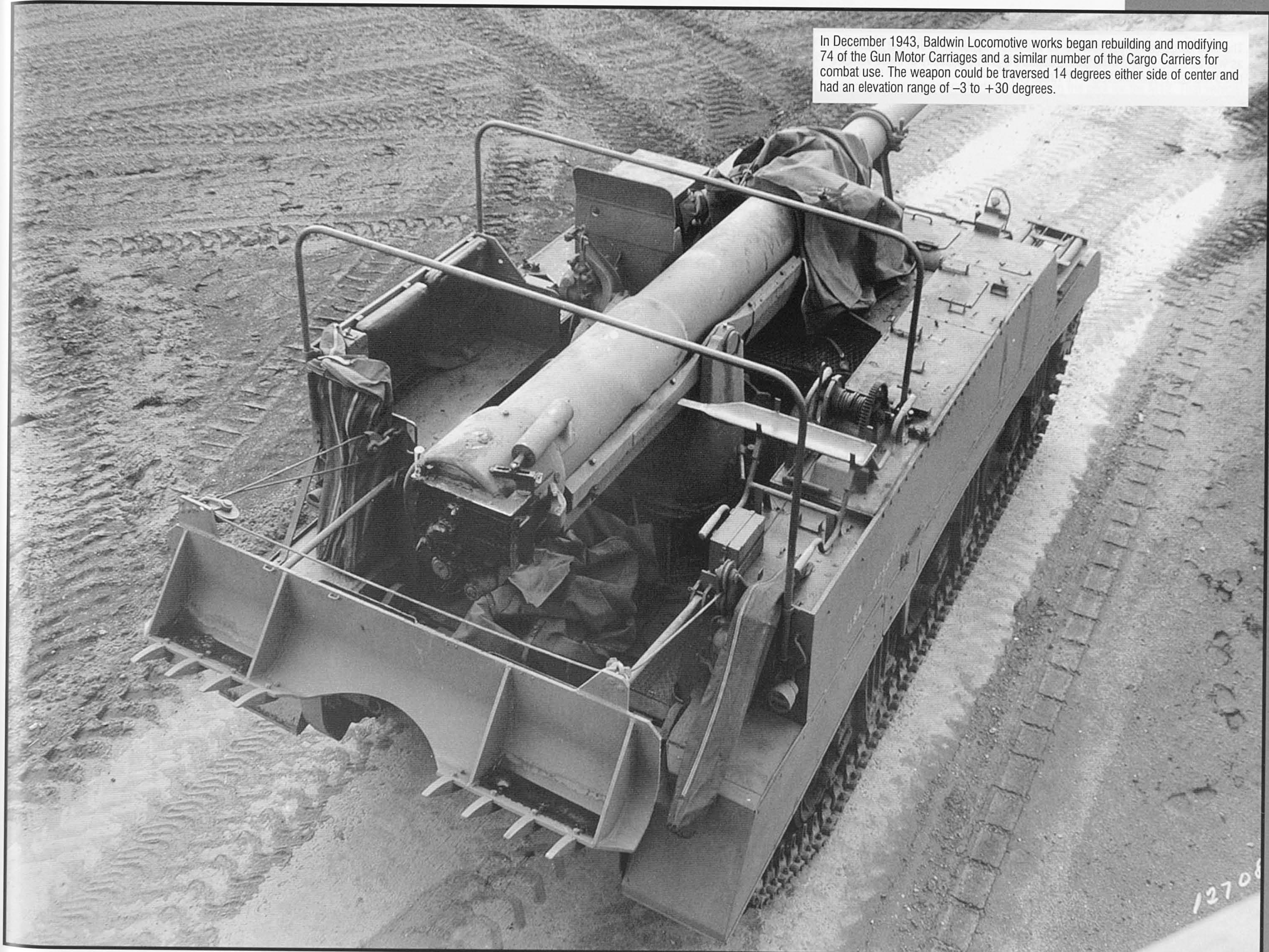




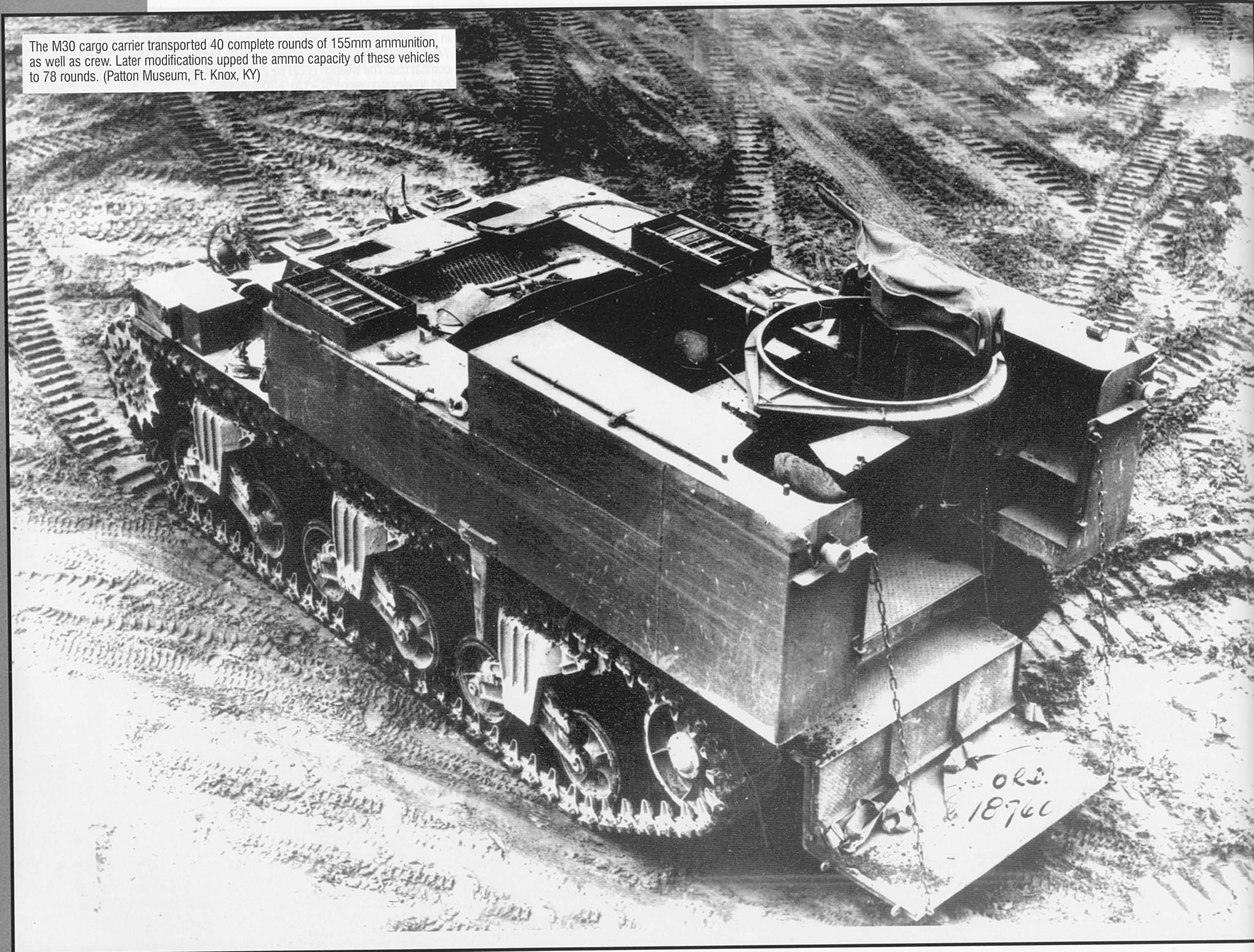
In January 1943 one production M12 was shipped from Pressed Steel to Aberdeen Proving Ground for permanent retention. The vehicle is still there today, but not in the condition shown in this February 1943 photo. Since this photo was taken, the left side of the superstructure has been extended upward. A similar modification was made to most, but not all, M12s to see combat. (Patton Museum, Ft. Knox, KY)



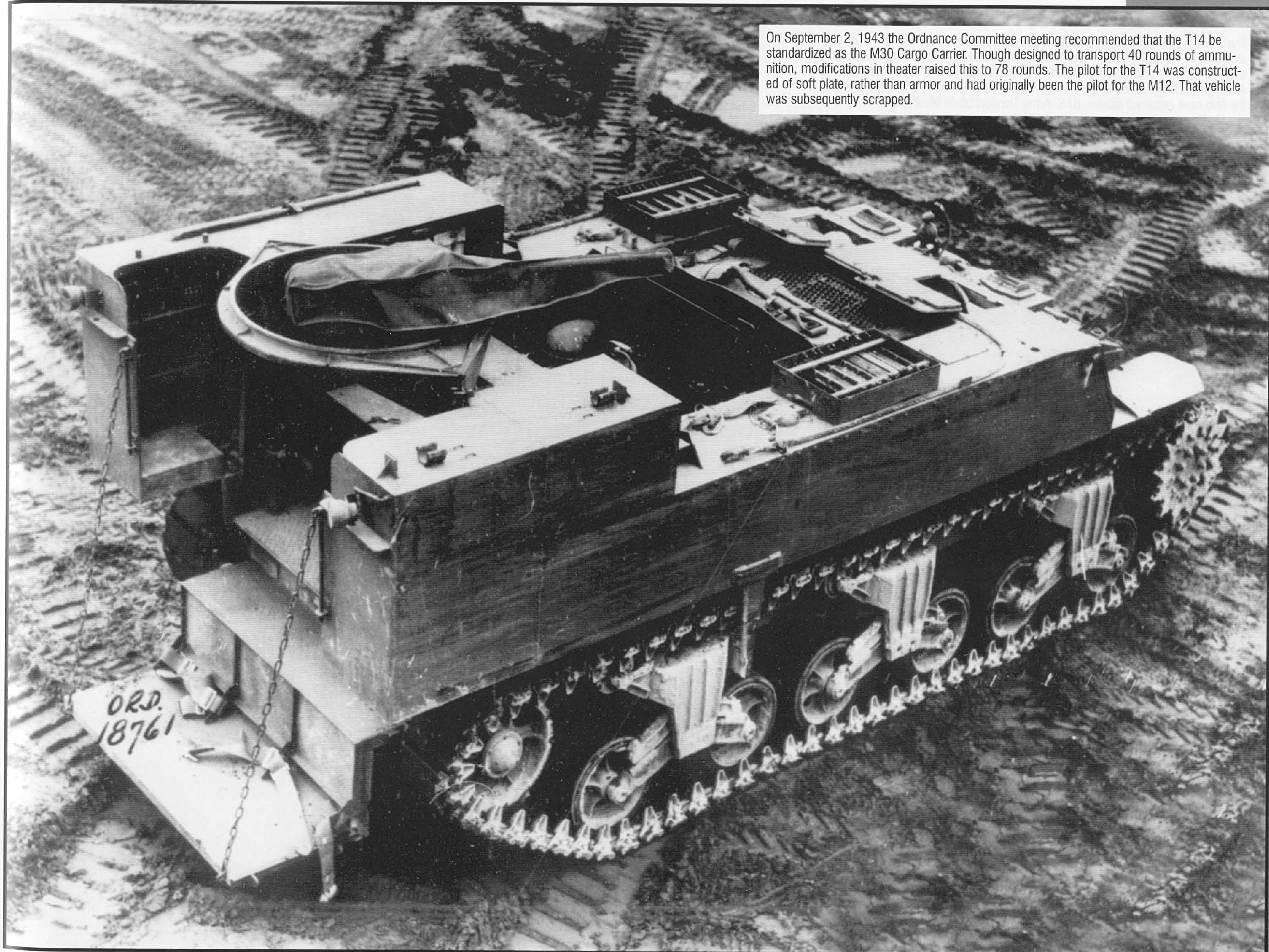
Another view of the 35th production vehicle taken at Aberdeen. The long rear overhang of the recoil spade was a hindrance to the off-road mobility of the vehicle and the engine life was only 160 hours. Despite these problem areas, the M12 forever changed the face of U.S. Army heavy artillery. (MVPA Archives)



In December 1943, Baldwin Locomotive works began rebuilding and modifying 74 of the Gun Motor Carriages and a similar number of the Cargo Carriers for combat use. The weapon could be traversed 14 degrees either side of center and had an elevation range of –3 to +30 degrees.



The M30 cargo carrier transported 40 complete rounds of 155mm ammunition, as well as crew. Later modifications upped the ammo capacity of these vehicles to 78 rounds. (Patton Museum, Ft. Knox, KY)



On September 2, 1943 the Ordnance Committee meeting recommended that the T14 be standardized as the M30 Cargo Carrier. Though designed to transport 40 rounds of ammunition, modifications in theater raised this to 78 rounds. The pilot for the T14 was constructed of soft plate, rather than armor and had originally been the pilot for the M12. That vehicle was subsequently scrapped.



The T14 Cargo Carrier was designed specifically to accompany the M12, and was also built by Pressed Steel Car Company. It was intended that it would be backed up to the M12 for re supply, much like today's M109 Palladin and support vehicle. Although drawings showing this arrangement have been found, photos of this use in the field have remained elusive. (U.S. Army Transportation Museum)



This M30 has been fitted with a weather cover over the driver's hatch. Like the M12, the M30 was declared obsolete on August 2, 1945, following up on a June 1945 recommendation. The same recommendation suggested that one each M12 and M30 be retained at Aberdeen Proving Ground for historical purposes. (Patton Museum, Ft. Knox, KY)



Though censors have obliterated some of the markings of the vehicles, many interesting things are shown in this view. In order to increase the elevation of their guns, this battery of the 991st Field Artillery Battalion has driven their motor carriages onto improvised ramps. The soldier in the foreground is carrying a propellant charge for the weapon. Soon, this powder will be hurling a shell toward Bildohen, Germany. (Patton Museum, Ft. Knox, KY)



On November 25, 1944 "Buccaneer" was firing from France into Germany. Though the installation of sand shields above the tracks was specifically requested by the Manufacturing Branch, few photos of M12s in action show the shields in place. (NARA)



Adolph's Assassin, a 991st Field Artillery Battalion vehicle, is shown in operation near Kornelmunster, Germany. This photo of a Battery A vehicle was taken on November 4, 1944. (Patton Museum, Ft. Knox, KY)



Snow is falling on November 15, 1944 as Battery C, 557th Field Artillery Battalion prepares for action near Morteau, France. Chocks have been placed in front of the tracks, and the spade lowered at the rear to hold the vehicle in place. (Patton Museum, Ft. Knox, KY)


Rounds are stacked behind this M12 as it fires in the Hurtgen Forest near Kleinhau, Germany on November 30, 1944. The big gun's voracious appetite for ammunition was cause for the development of the M30 carrier. (NARA)



This oft-reproduced photo of "Choo-Choo-Barn" supporting Patton's Third Army in Luxembourg is a classic. By the time this photo was taken in February 1945, the 155mm Gun Motor Carriage was well accepted and the Army wanted more of the heavy weapons. (NARA)



"The Persuader" of Battery B, 557th AFAB, 9th Army crosses a Treadway bridge near Linnich, Germany in February 1945. The gap between hull and spade has been filled with stowage, items the crew has gathered during their forward advance. (NARA)



Heavy mud impeded the advance against the Siegfried line in Luxembourg in February 1945. Fortunately, self-propelled artillery, such as this M12, was able to support the 5th Infantry Division. These vehicles were much better suited for this type of operation than were the towed field pieces favored early in the war. (NARA)



Army photographers documented firing tests of the M12 being conducted at Aberdeen Proving Ground. The superb French designed 155mm GPF (Grand Puissance Filloux) could hurl a 100-lb round up to 33,000 yards, with devastating effect. (NARA)

Kradschüzten and Kradmelder, part 2

Motorcycles were used by troops of all countries involved in WWII, but much more extensively by Germany than any other nation. Prior to the outbreak of WWII and throughout the war, motorcycles were an integral part of their military strategy. Unlike the U.S., who viewed the motorcycle primarily as an instrument of messengers and police, to Germany the motorcycle was a means of quickly inserting heavily armed troops deep within the vulnerable rear areas of their opponents. Employing large numbers of motorcycles together, their troops equipped with heavy machine guns, was the norm in the early stages of the war. Military training of motorcycle troops began before the war under the guise of motorcycle club's off-road competition. With the war fully underway, motorcycles were considered so important that they were nationalized. That is, representatives of the government, using motorcycle registrations, approached private owners and purchased their bikes – whether or not the owner wanted to sell, and often conscripted the former owner as well. Naturally, before this "nationalization" began, procurement from builders had begun, including this model R4 from BMW.





These Kradmelder of the 5th Panzer Regiment, 3rd Panzer Division share a meal while preparing to deploy to France in the spring of 1940. As the distances traveled will not be long, their BMW R12 bikes have only been secured with light cord.



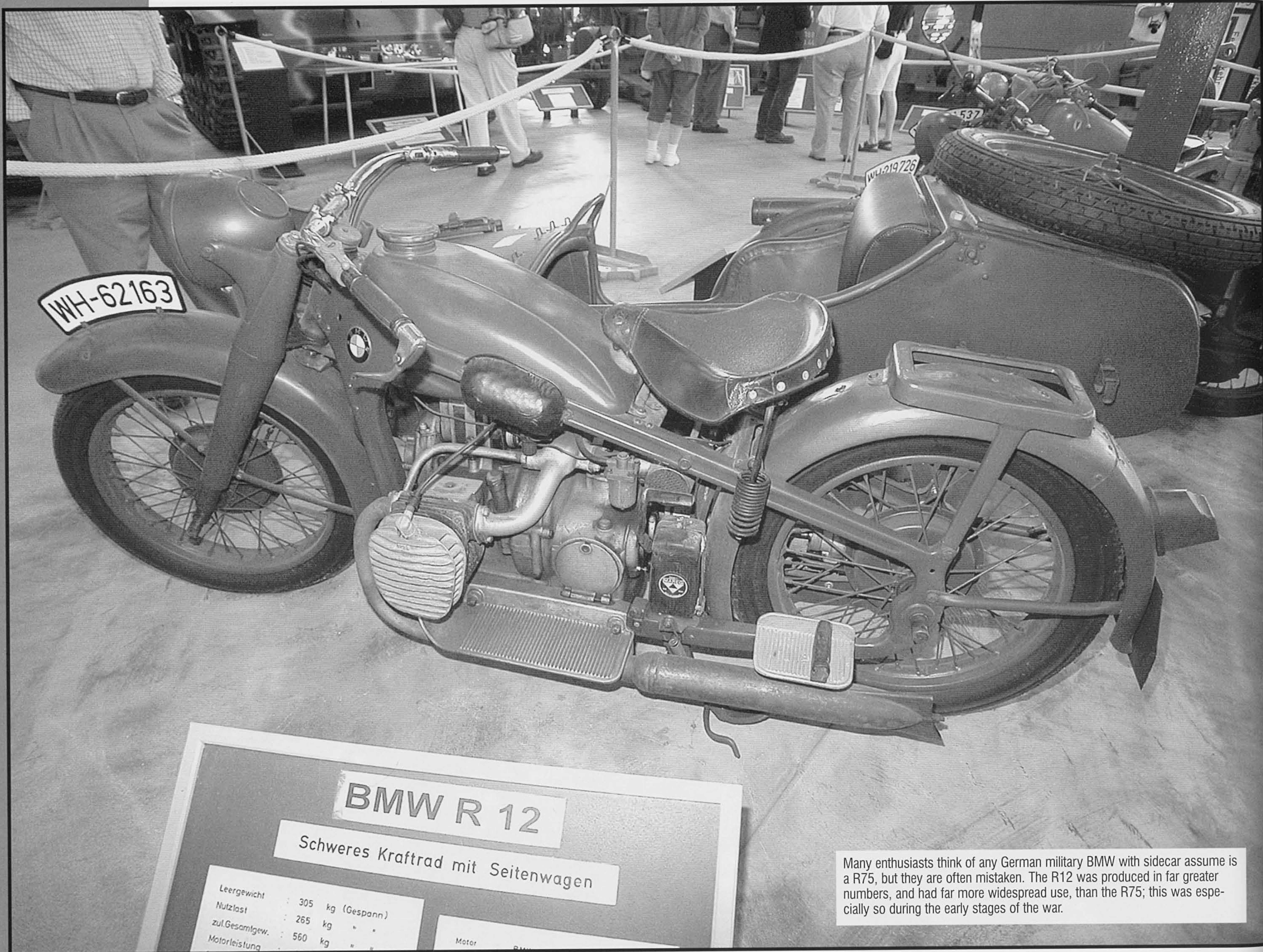
Another shot of the same unit during winter training in late 1940. This R12 has seen heavy use during the previous spring and summer, as evidenced by the heavy wear on the front of the sidecar.



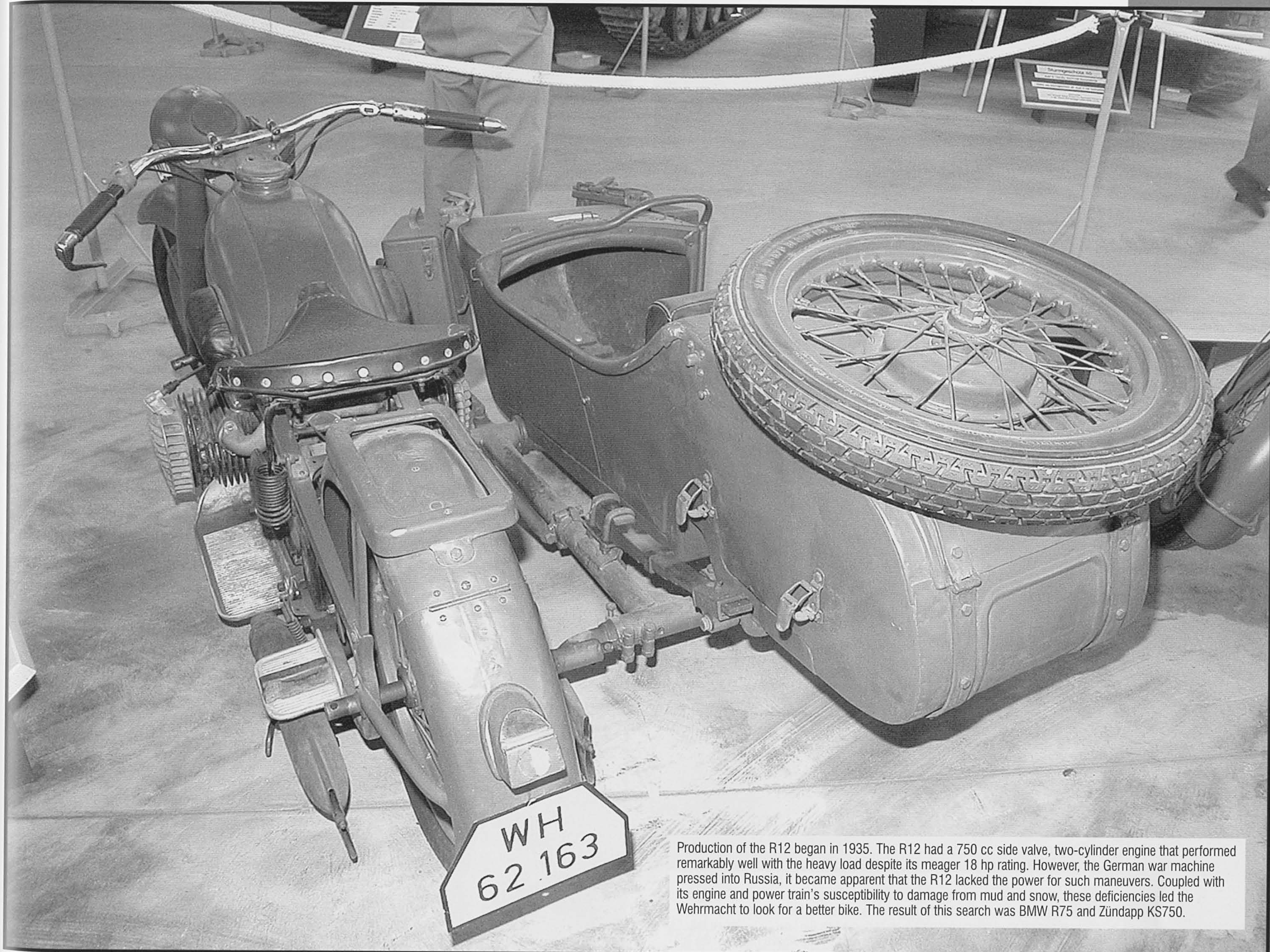
Sharing a water crossing with bicycle mounted infantry; this R12 is pushed across less than a foot of water with the assistance of an engineer. The sidecar of the R12 was not powered, a weakness in off road operation that was corrected on the later R75. Note the prominent BMW logo on the side-car—still a familiar sight today. (BA)



The R12 was used as both a solo machine and with sidecars. This three-man crew, typical of German sidecar bikes, was photographed taking a break in front of their machine. (BA)



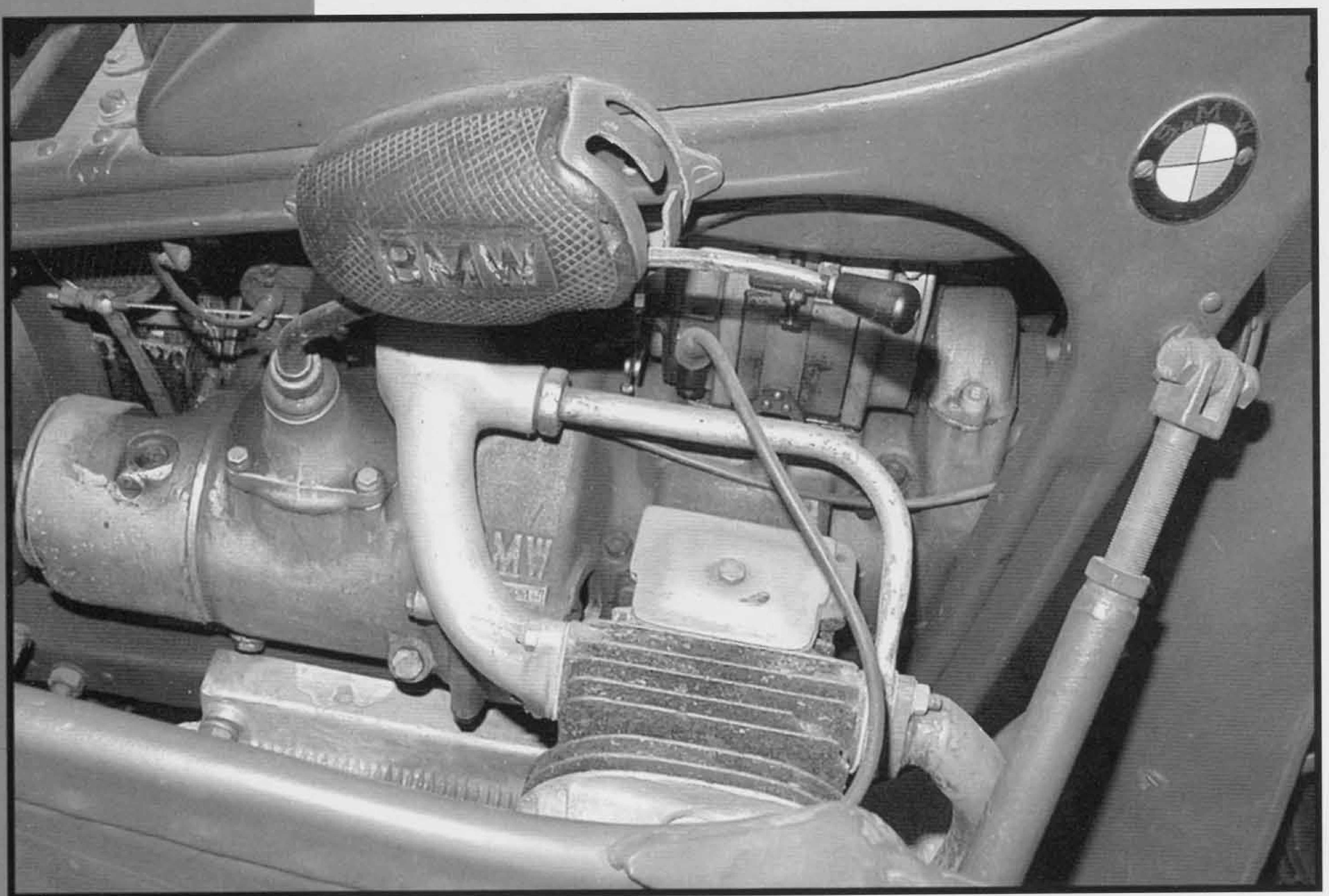
Many enthusiasts think of any German military BMW with sidecar assume is a R75, but they are often mistaken. The R12 was produced in far greater numbers, and had far more widespread use, than the R75; this was especially so during the early stages of the war.

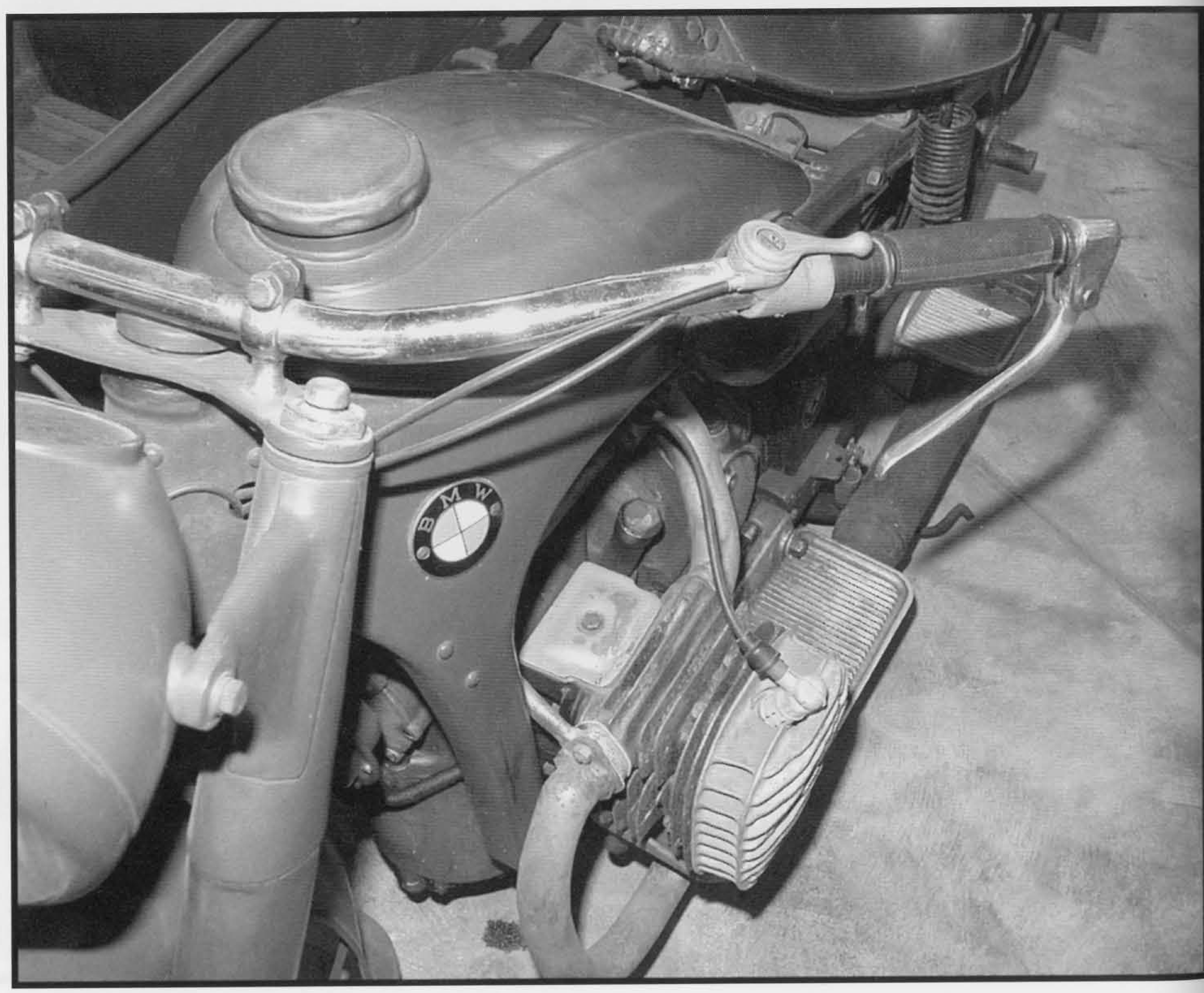


Production of the R12 began in 1935. The R12 had a 750 cc side valve, two-cylinder engine that performed remarkably well with the heavy load despite its meager 18 hp rating. However, the German war machine pressed into Russia, it became apparent that the R12 lacked the power for such maneuvers. Coupled with its engine and power train's susceptibility to damage from mud and snow, these deficiencies led the Wehrmacht to look for a better bike. The result of this search was BMW R75 and Zündapp KS750.









Top left: The throttle was on the right handgrip, as was the brake lever. The right foot operated a heel-operated brake. **Top right:** The sidecar of the R12 was powered, a weakness in off road operations that was corrected on the later R75. **Above left:** The R12 was equipped with a tank-mounted right-hand shifter. **Above right:** On the left hand grip was the clutch and timing lever.



The BMW R35 was a solo machine that could be distinguished by its telescopic front forks. The R35's primary operational use was as a dispatch bike, such as this example. Still, the large, civilian-style fenders remained and were prone to becoming packed with mud.

Just as many buffs think that all WWII German BMW's are the R75, similar misconceptions exist regarding Zündapp bikes. The KS750 was only one of many models that this firm produced. Seen above are riders training with the K500, which the German motorcycle corps used extensively for this purpose. The pressed-steel forks, used on most Zündapp bikes, help identify their products.





The Zündapp KS600 was introduced in 1938 as a replacement for the K500. With a more powerful, overhead cam engine, this bike could be coupled to a sidecar. This motorcycle-sidecar pair is believed by many to be the best combination machine fielded by the German army prior to the advent of the very heavy R75/KS750 units.



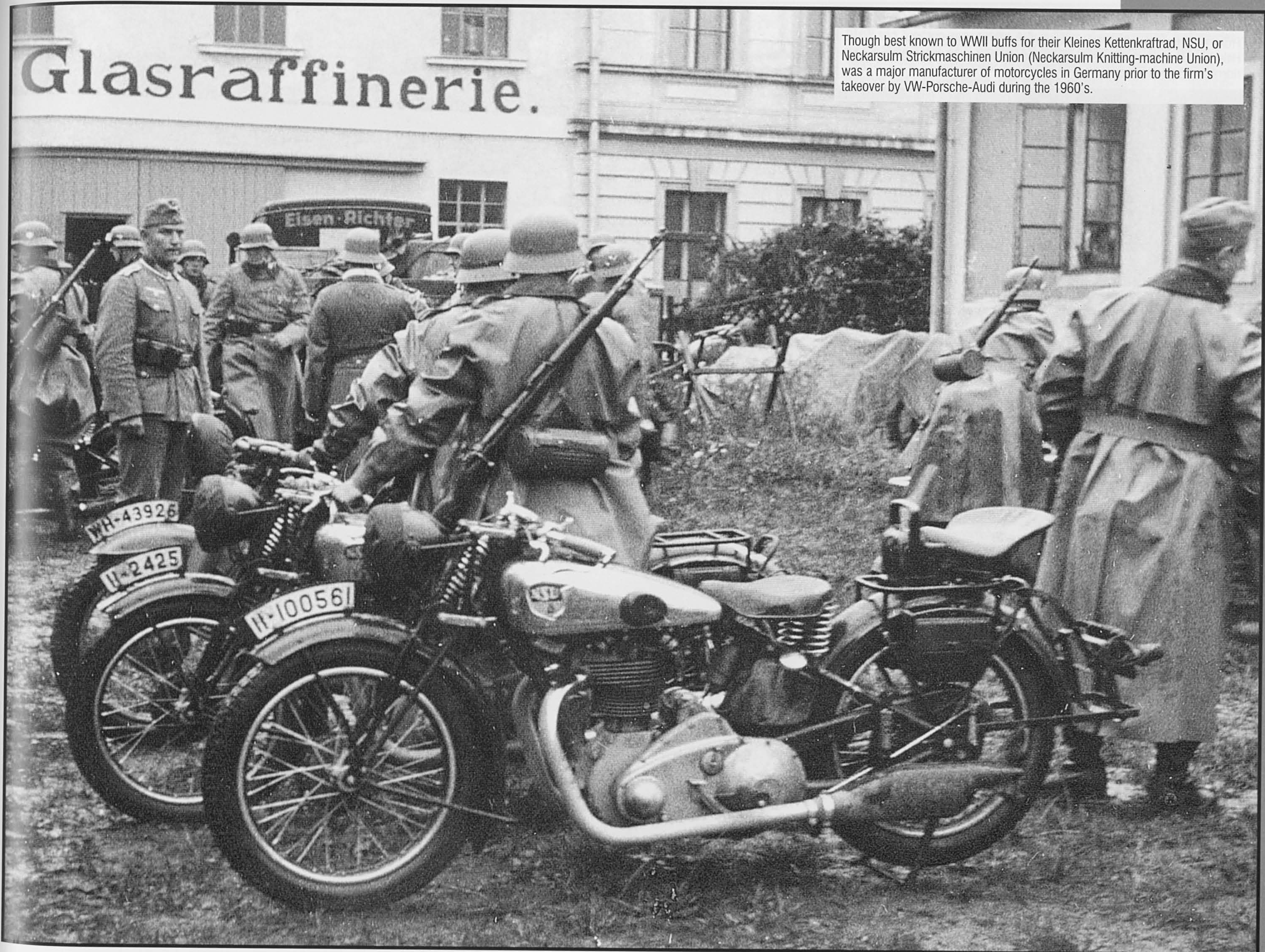
The Zündapp KS750 was developed concurrently with the BMW R75, and in fact many components were interchangeable. The sidecar wheel was powered via a Zündapp-designed differential that was also used by BMW. The machine used a complex, parallelogram front fork. Though somewhat maintenance intensive, it provided superior riding and handling.



The Zündapp K800 and KS800 were powered by the largest engine of any motorcycle ordered by the Wehrmacht. For this reason it was forbidden to operate it without the sidecar, although this was done occasionally. Note the repetition of the motorcycle's registration number on the rear saddlebag. Perhaps a hedge against theft?



Zündapp, located in Nürnberg, was a major supplier of military motorcycles. Founded in 1917, at the outset the firm had an enviable group of founders. In addition to director Fritz Neumeyer, Fredrich Krupp AG and machine tool manufacturer Thiel organized the company. Zündapp's emphasis shifted to motorcycles and in 1931 their K-series heavy motorcycles entered production. "K" was an abbreviation of "Kardanantrieb," or suspended drive, a feature of these heavy bikes. These machines ranged from 200cc units to the 800cc powerhouses shown here.



Though best known to WWII buffs for their Kleines Kettenkraftrad, NSU, or Neckarsulm Strickmaschinen Union (Neckarsulm Knitting-machine Union), was a major manufacturer of motorcycles in Germany prior to the firm's takeover by VW-Porsche-Audi during the 1960's.



From 1934 through 1944 NSU produced 35,000 of their 251-OSL for Hitler's war machine. This lightweight motorcycle was intended for dispatch riders and general liaison work.

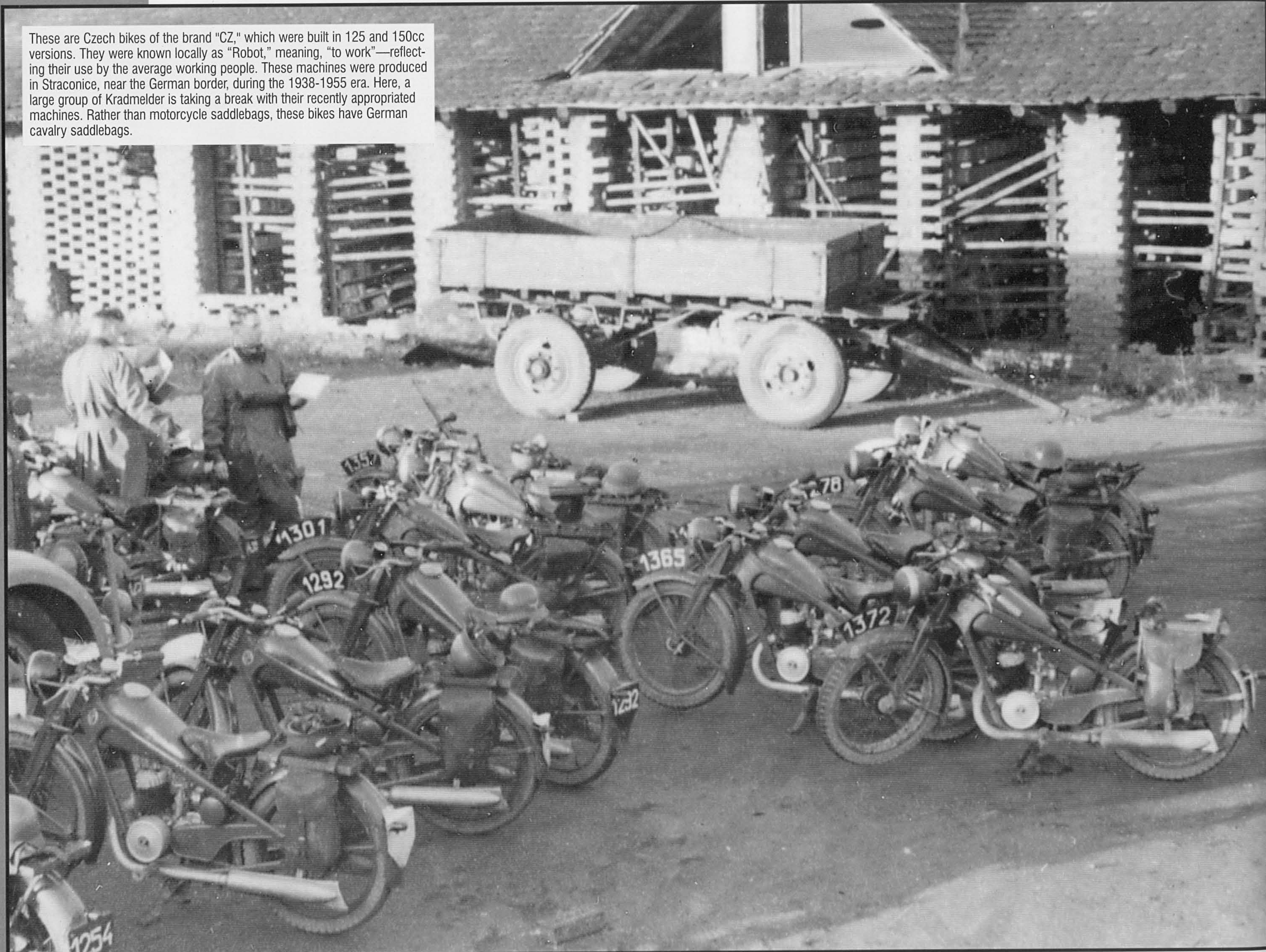


BMW and Zündapp were not the only builders of heavy sidecar motorcycles for the Wehrmacht. NSU supplied the troops with their 601-OSL during 1938-40. The 24 horsepower, single cylinder machine had a four-speed gearbox and a tubular frame. This privately owned bike has been "appropriated" by GI's and sports civilian registration, as well as shin guards. (NARA)



The NSU 201-ZDB was built from 1935-1940 and this rare survivor is on display at the Panzer Museum in Munster. A light dispatch bike, it is powered by a single-cylinder, two-stroke 198cc engine developing 7horsepower at 4150 RPM.

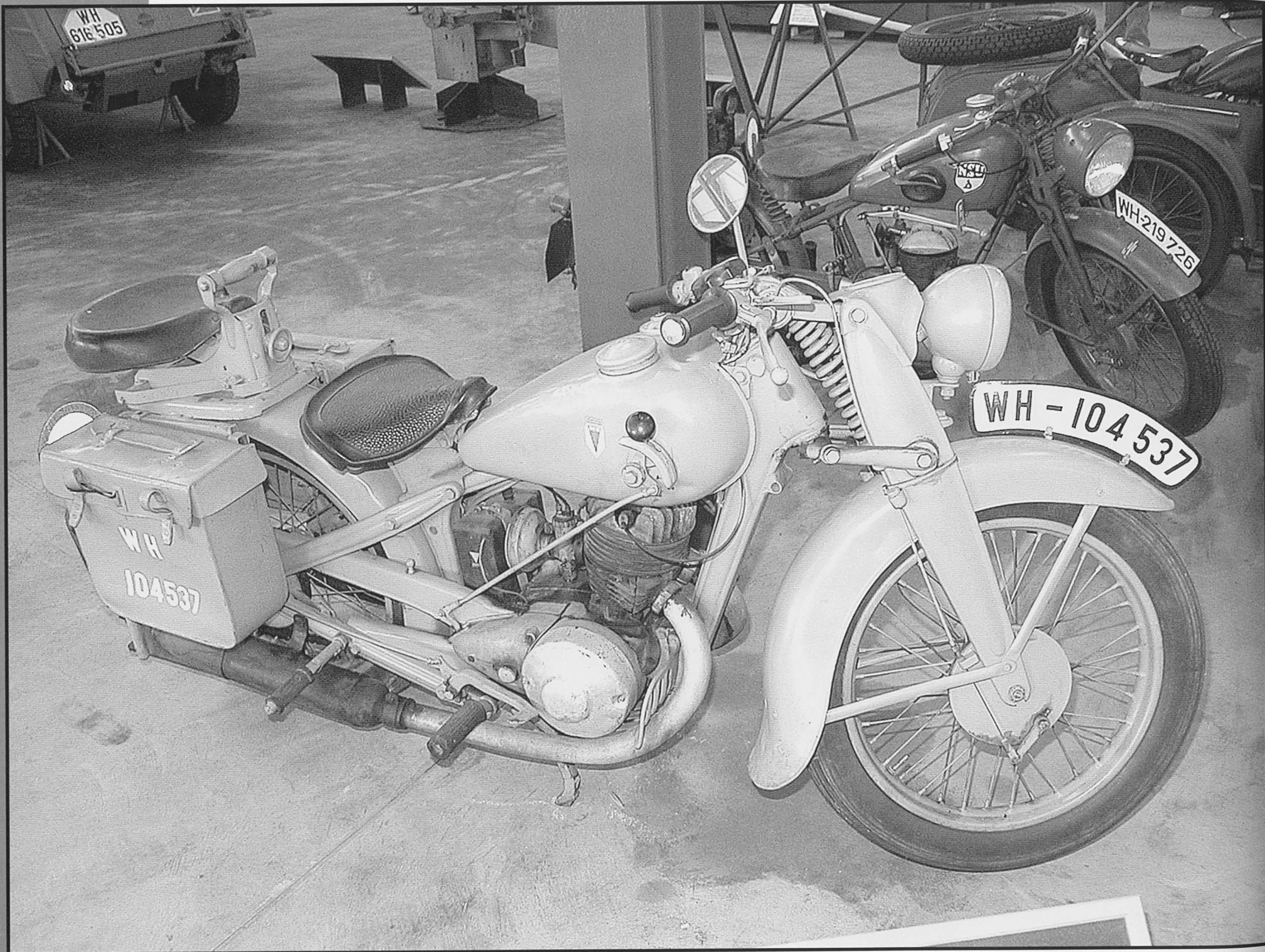

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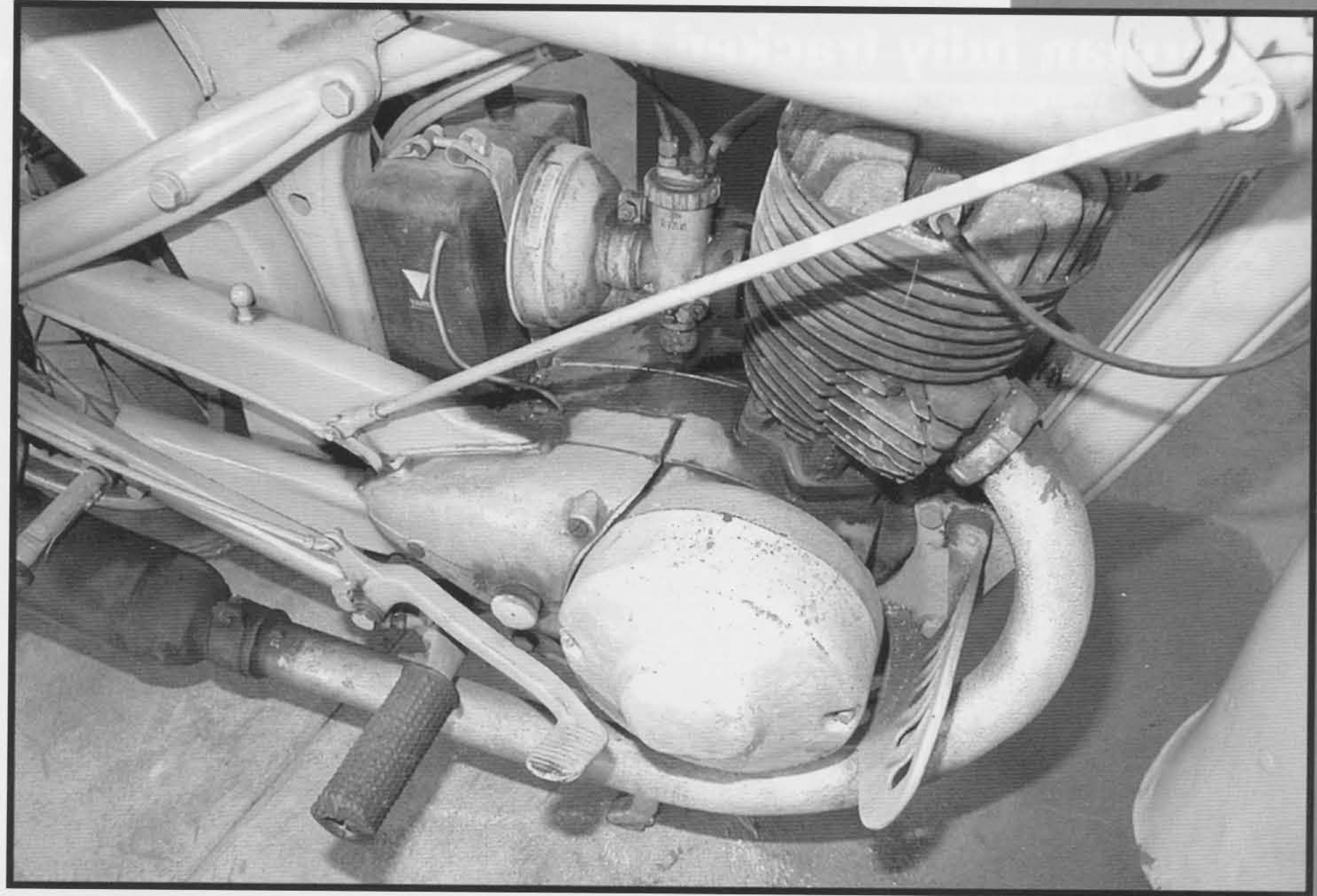
These are Czech bikes of the brand "CZ," which were built in 125 and 150cc versions. They were known locally as "Robot," meaning, "to work"—reflecting their use by the average working people. These machines were produced in Straconice, near the German border, during the 1938-1955 era. Here, a large group of Kradmelder is taking a break with their recently appropriated machines. Rather than motorcycle saddlebags, these bikes have German cavalry saddlebags.

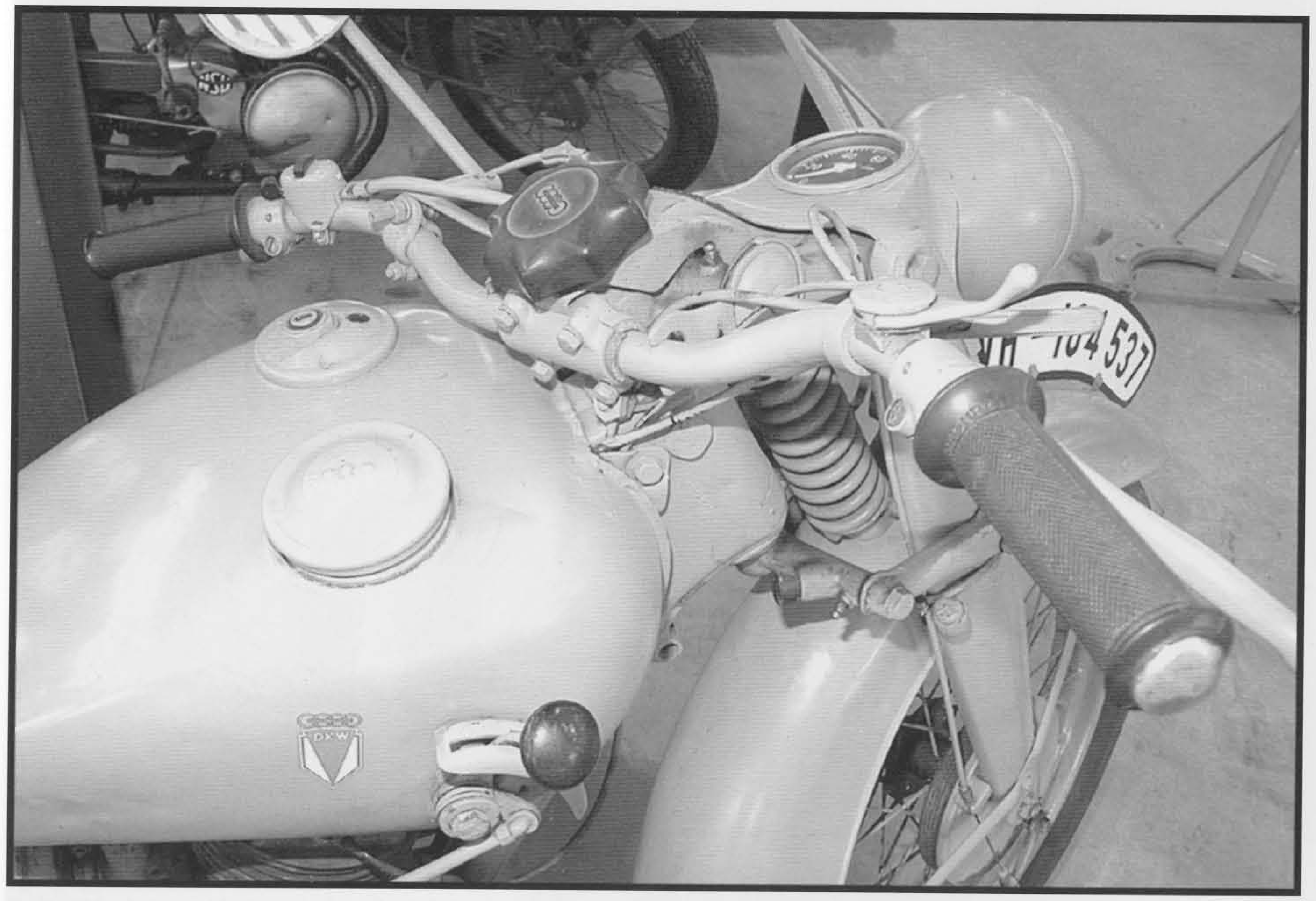


As the war progressed, the German government began to conscript civilian motorcycles (and often their owners, as well). This may, or may not have been the case with this snazzy DKW and sidecar. It still wears its civilian paint scheme, which probably made it irresistible to its new owners. (NARA)


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Also on display in Munster is this DKW-produced NZ350. Used by the German army as a medium courier bike, the machine was produced from 1938 through 1940. The NZ-350 had an aluminum frame, making it unusually light. The two-stroke 346cc single cylinder engine drove the rear wheel through a four-speed gearbox and a chain-drive. The combination of lightweight and efficient gearing gave the machine a 105 km/hr top speed. Even though the bike was not robust or powerful enough for all the military asked of it, it continued to serve until the end of the war.

German fully tracked flamethrowers

Pz.Kpfw. II (Flamm) Ausf. A and B (Sd.Kfz. 122) Flamingo



Development of this flame-throwing tank, based on the Panzerkampfwagen II, was begun in early 1939. Prior to this, a few Panzer Is had been retrofitted with flamethrowers by troops in the field. Those field-modified tanks were only marginally successful, as the useable range of the flamethrowers, which were originally man-packs, was too short to use without the tank becoming vulnerable. The Panzerflammwagen (Sd.Kfz. 122), later known as the Panzerkampfwagen II (Flamm), addressed this problem in a variety of ways. A specially designed flame nozzle, known as a Spritzköpf, was mounted on each front fender. These spray heads were independently traversable through 180 degrees. These nozzles were engineered to maximize the range of the flame oil. The fluid was propelled by compressed nitrogen that was stored in four cylinders inside the tank. An acetylene-fueled torch provided ignition of the oil. Production of the Ausf. A began in April 1939. Wegmenn built forty-six vehicles on the Panzerkampfwagen II Ausf. D chassis that in turn had been manufactured by M.A.N. Additional flamethrowers were built by Wegmann based on conventional gun tanks returned for conversion. Orders for 150 Ausf. B vehicles were placed even before the first series was completed. Production of this series, utilizing newly assembled M.A.N. chassis began in August of 1941, but prior to that date the order had been reduced to 90 vehicles. That decision was subsequently reversed and new orders came down instructing that the remaining chassis be used to construct tank-killers. Sixty-two Ausf. B flamethrowers had been constructed by that time. Eventually, even these vehicles were converted to tank killers, losing their entire flamethrower structure. Though they saw limited action, these vehicles, like most flame weapons, were very effective. (BA)

Panzer B2 (F)



Consistent with the German military practice of reusing or adapting for front-line service those enemy vehicles captured in large numbers, the decision was made to build a flame-projecting tank utilizing the French Char B as its basis. The French hull-mounted 7.5 cm gun was removed, and in its place was installed the same type Flammenwerfer-Spritzköpf that had previously been used on the Panzerkampfwagen II (F). Twenty-four tanks were converted in this manner. These in turn were issued to Panzerabteilung (F) 102, which employed them in operation Barbarossa. Interestingly, the French had also originally fielded the Char B as a flamethrower. There is some speculation that the German design was simply copied from the French one. Development of Char B-based flamethrowers continued with a second series. These vehicles differed from the initial production in that a pump was used to induce the flow of the flame oil rather than the compressed nitrogen used previously. The flame oil was stored on the rear of the tank in a fuel compartment made of armor plate. At least 60 of these improved flamethrowers were built beginning in December 1941 and the vehicles served on both fronts for the duration of the war.

The German military liked the idea of a flame-throwing tank and the Panzer II-based flamethrower was reasonably successful. Therefore the decision was made to produce a second series of Flammpanzers based on captured French Char B tanks. This Panzer B2 (F) was knocked out in Holland in 1944. (NARA)



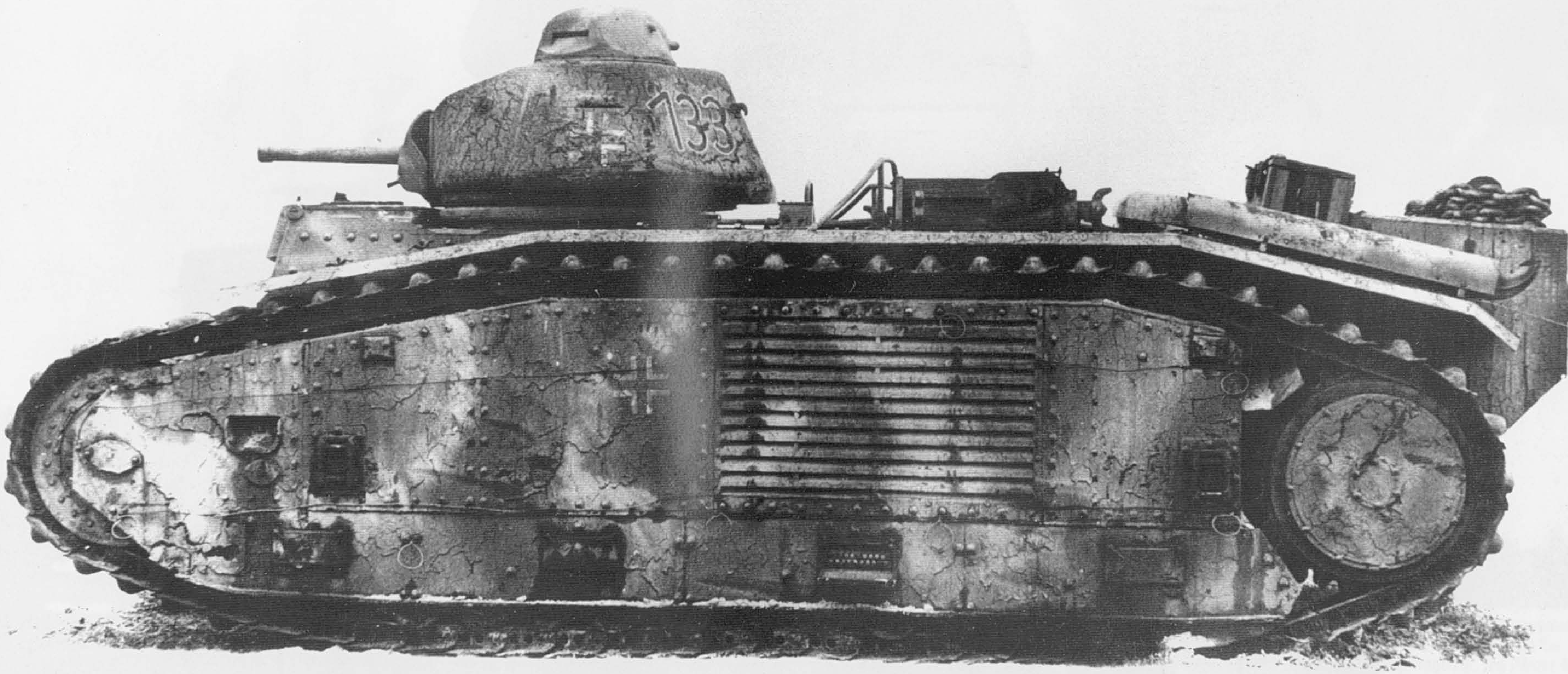


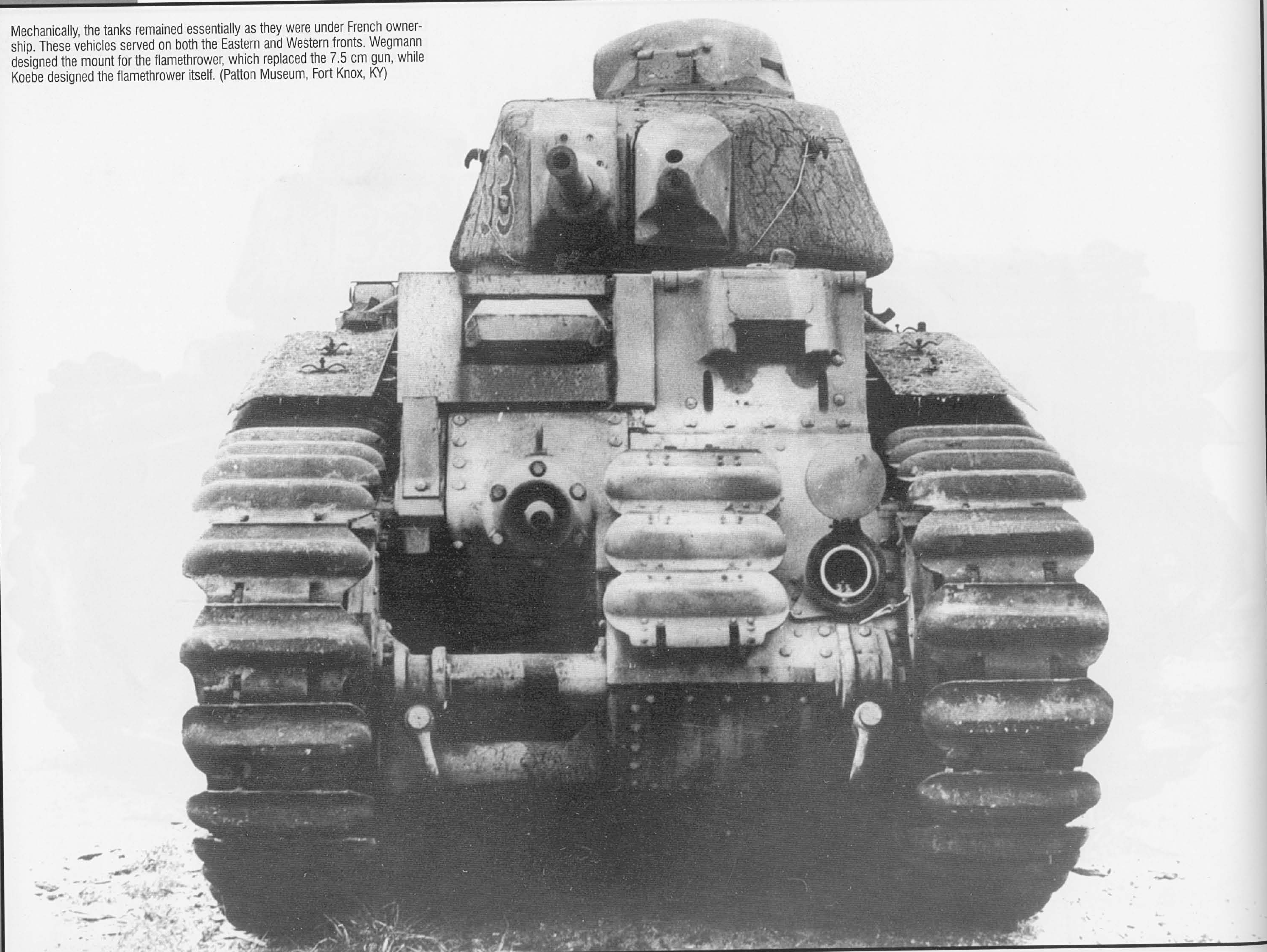
The main armament of the Char B was normally a 7.5 cm gun mounted in the hull. As part of the flammpanzer conversion process this gun was removed and the flame projector took up the space it occupied. (Patton Museum, Fort Knox, KY)



A large armored flame oil tank was added to the rear of the converted Char Bs. Enough oil was available for 200 bursts of flame. (Patton Museum, Fort Knox, KY)

Unlike earlier systems, which used pressurized gasses (usually nitrogen) as a propellant, the second series of Char B conversions used a pump to force the flame oil through the nozzle. (Patton Museum, Fort Knox, KY)





Mechanically, the tanks remained essentially as they were under French ownership. These vehicles served on both the Eastern and Western fronts. Wegmann designed the mount for the flamethrower, which replaced the 7.5 cm gun, while Koebe designed the flamethrower itself. (Patton Museum, Fort Knox, KY)

German fully tracked flamethrowers

Panzerkampfwagen III (Fl)



Pleased with the success of the Koebe pump-driven flame system mounted in the second series of Panzerkampfwagen B2 (F), the Waffenamt had the same system installed in the turrets of Panzerkampfwagen III. The Panzer III Ausf. M was used as the base vehicle for these conversions. The hull-mounted MG 34 was retained and a second mounted coaxially with the flame projector in the turret. A small Auto-Union engine powered the pump, which was fed from two containers holding a combined 1,020 liters of flame oil. Ignition for the flame oil was electrical, as opposed to the acetylene used with the Panzerkampfwagen II-based Flammpanzers. One hundred of these vehicles were completed by Wegmann in Kassel, all on chassis produced by Miag. These vehicles were used in platoon-sized units in both Italy and along the Eastern front. **This page:** Flame is an extremely demoralizing weapon and naturally is terribly effective against infantry. However, it has an extremely short range and the smoke generated makes it fairly easy for opposing artillery to target return fire. (Patton Museum, Fort Knox, KY)



Crews of the Flammpanzers, such as this Panzerkampfwagen III (Fl), had to undergo specialized training, not only in the equipment, but tactics as well. This crew was photographed during a training exercise. (Patton Museum, Fort Knox, KY)



The Panzerkampfwagen III (Fl) used a variation of the pump-supplied flame projection system that had been developed for the Panzer B2 (F). Raw oil could be projected 50 meters, while burning oil could reach a little farther, out to 60 meters. (Patton Museum, Fort Knox, KY)



The flame oil itself was a powerful irritant. Dousing infantry, even without ignition, could induce surrender. Of course, leaks and spills inside the tank were hazardous to the tank crew. The oil had a good saturation effect, and once sprayed and ignited, most frame structures burned until completely destroyed. (Patton Museum, Fort Knox, KY)

German fully tracked flamethrowers

Sturmgeschütz-I (FLAMM)



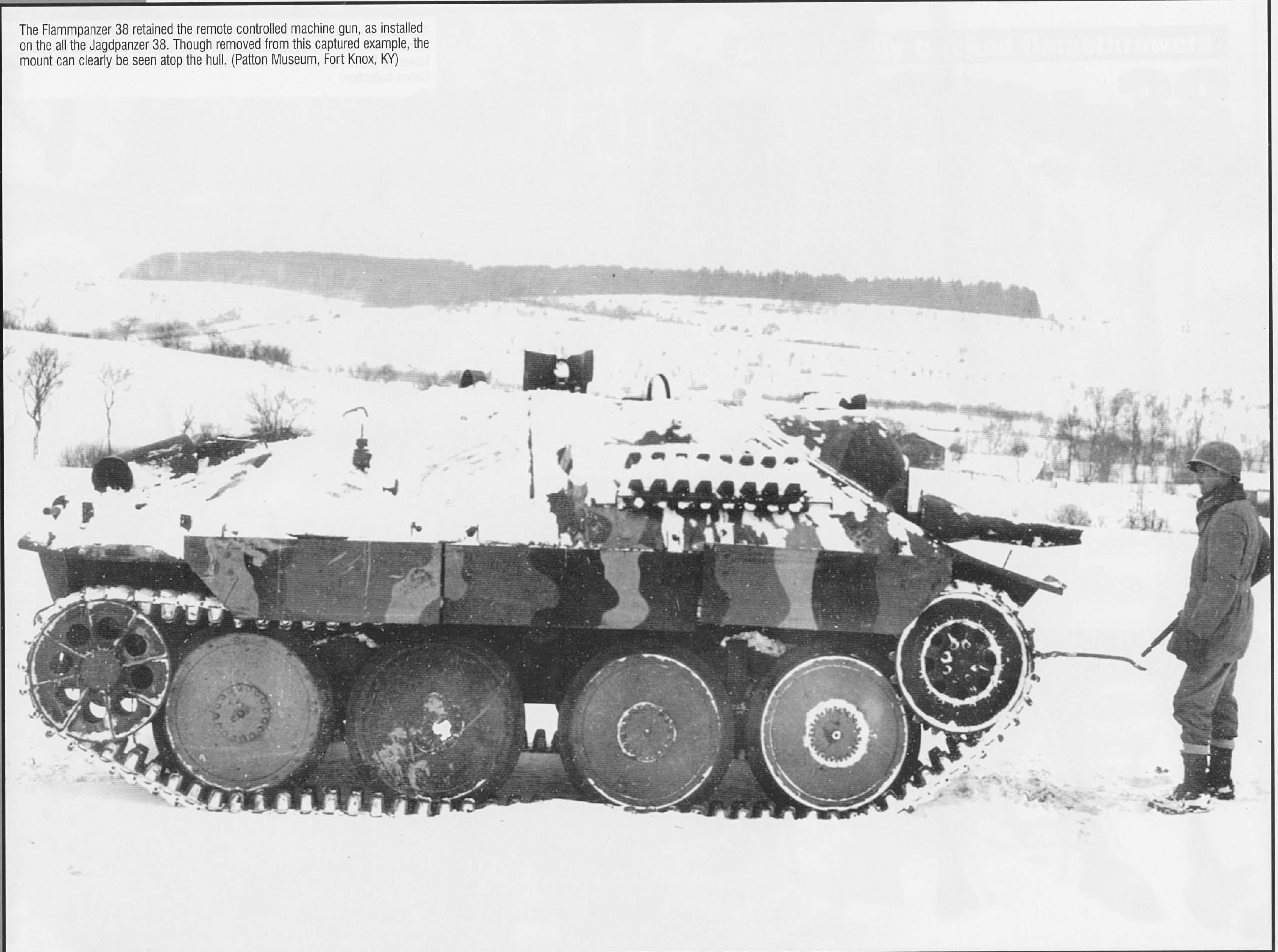
In December of 1943, Hitler approved the conversion of ten Sturmgeschütze into flamethrowers. Initially it was thought that new chassis would be used for these vehicles, but in the end it was decided to utilize ten older vehicles that had been returned for depot overhaul. Nine of these converted vehicles were available in May 1943, with the tenth one being completed the following month. Very little information about these ten vehicles has surfaced. One was lost due to an accident and had to be rebuilt in July. The rebuilding process took two months. At least two of these vehicles were again converted, this time reverting to their original assault gun configuration in 1944. A limited number of Sturmgeschütz were converted to flamethrowers, per Hitler's request. The superstructure was modified and this unusual-looking mounting assembly installed in its place. Some of these vehicles were later converted back into standard Sturmgeschütz. Photos of this vehicle remain rare and, even though the quality is less than optimum, this shot does show the general layout of the flame nozzle well. (NARA)

German fully tracked flamethrowers

Flammpanzer 38



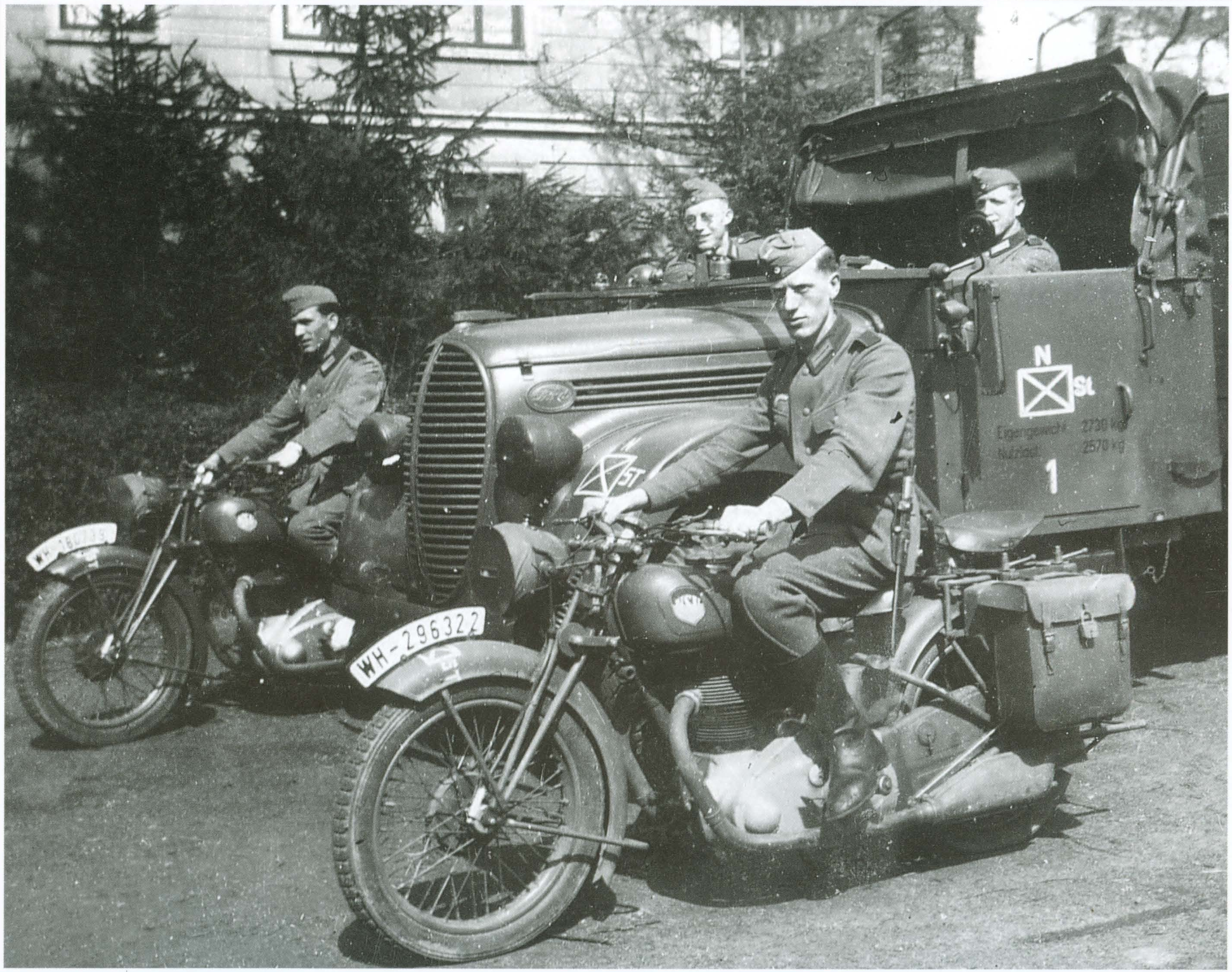
Once again Hitler's special interest in flamethrowers came into play during November 1944. At that time, he demanded that a large number of flame tanks be made available in a short period of time. Responding to this demand, twenty Jagdpanzer 38 were drawn from the CKD factory on December 8, 1944 for conversion to flamethrowers. The Koebe pump operated projection system was chosen for the Flammpanzer 38. Cartridge-type igniters were used with this installation, having been perfected in May of 1944. Seven hundred gallons of flame oil were carried, which meant that the Flammpanzer could fire 60 or so short bursts with out refilling. A sleeve was installed around the flame projector tube to camouflage the vehicle as a normal tank destroyer. Unfortunately this tube was flimsy, and when damaged, fouled the flame projector, preventing its operation. Mechanically, the Flammpanzer 38 was identical to the familiar Jagdpanzer 38. However, the lighter load on the front suspension due to the flame gun did improve steering. The Flammpanzer 38 saw their first combat during Operation Nordwind the winter of 1944-1945. The vulnerability of flame tanks to conventional tank and antitank weapons resulted in high losses, but the vehicles continued to be employed well into 1945. Although heavily retouched, this shot shows the arrangement of the nozzle and its sleeve. (Patton Museum, Fort Knox, KY)



The Flammpanzer 38 retained the remote controlled machine gun, as installed on the all the Jagdpanzer 38. Though removed from this captured example, the mount can clearly be seen atop the hull. (Patton Museum, Fort Knox, KY)



The same characteristics that served it well as a tank destroyer, low profile, narrow track, and well-sloped armor, were of benefit to the Flammpanzer 38. However, it also had the same weakness: thin side and rear armor. (Armin Sohns collection)


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